

# PERSONAL COMPUTING

*Telecommuting Facts And Fancies*

*High-End Systems: The Price Of Power*

*Computers As Portfolio Pundits*

*Personal Computing Magazine*  
ANNOUNCES THE BIRTH OF A  
NEW GENERATION OF COMPUTERS

Name: **CONCEPT**

Date of Birth: **1982**

Height: **16 BITS**

Weight: **256 k**

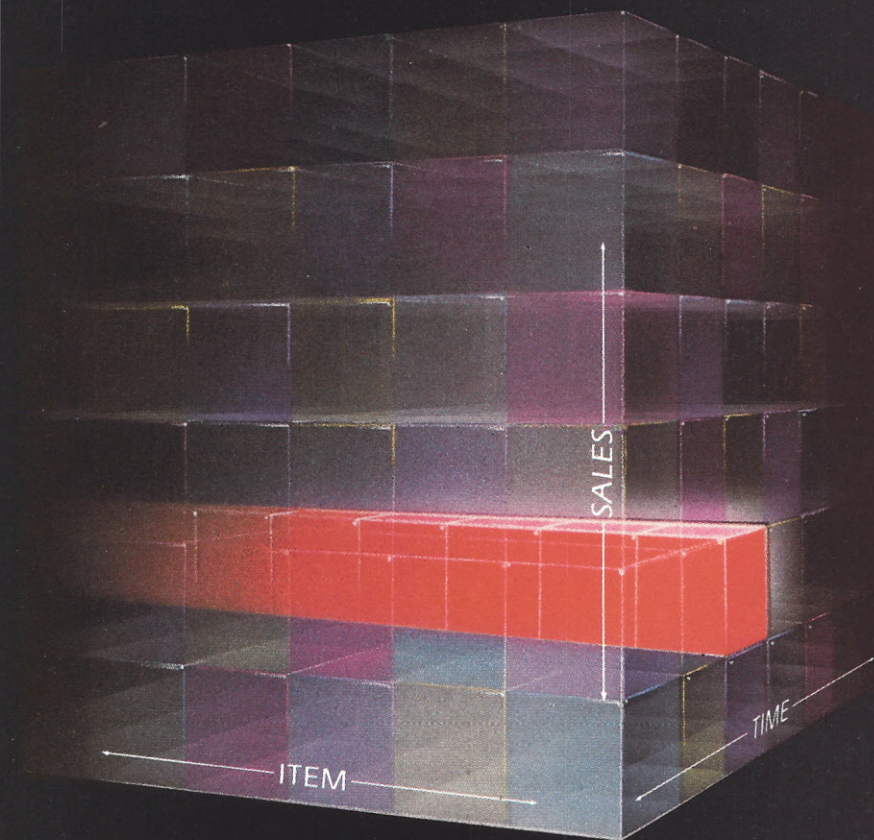
Unique Trait: **EASY INTERACTION**

Parents: **PERSONAL COMPUTING  
INDUSTRY**





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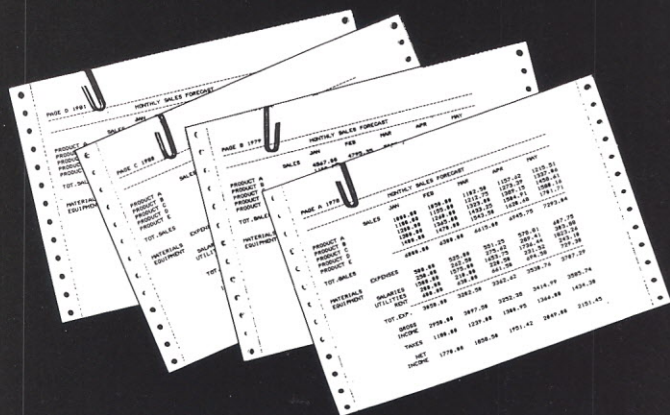


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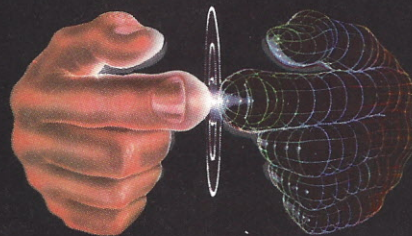
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Sample printout showing use of X, Y, and Z axes.  
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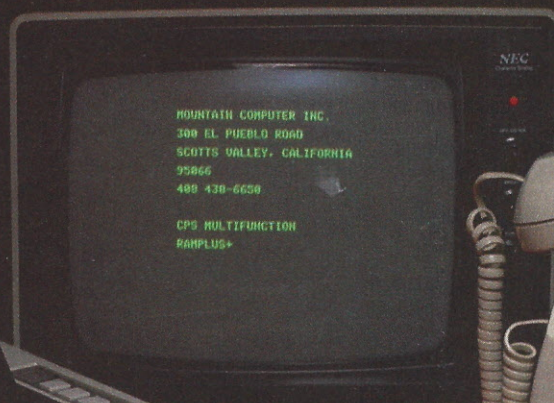
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CIRCLE 2



May 1982

Volume 6 Number 5

A Hayden Publication

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Cover story begins on page 174.  
**The Corvus CONCEPT, a 16-bit product with  
 256k of RAM, heralds the new generation.**

## FEATURES

### 30 INTERVIEW **A PERSONAL COMPUTING INTERVIEW WITH JIM DOWE**

Taking an idea about how the human brain does pattern matching and turning it into a product that's best described as artificial intuition is what Jim Dowe is all about. And hindsight may see his research as the turning point in the man/machine interface.

### 42 PROFESSIONAL **WOULD WORKING AT HOME BE WISE?**

*By Margo Downing-Faircloth*

Despite many obstacles, the telecommunications capabilities of personal computers, along with the innovative spirit of many corporations, are making telecommuting an alternative U.S. workstyle. The question is this: How well does it work?

### 52 SPECIAL REPORT **HIGH-END SYSTEMS: THE PRICE OF POWER**

*By Lee Thé*

There may come a time when your computer just can't handle the work you have for it. But you can avoid the frustration and potential financial loss caused by this problem if you understand your needs—both present and future.

### 58 LEISURE **KEYBOARD CHARISMA—MAKING MUSIC BY COMPUTER**

*By Jordan Gold*

You need not have a strong music background, much manual dexterity or fine arts talent to make music with your micro. All you need is a computer and the desire to turn your leisure time into time that soothes the savage breast.

### 62 BUSINESS **PLANNING YOUR PERSONAL PORTFOLIO**

*By Don Woodwell*

The economic turbulence of the first part of this decade is challenging even professional portfolio planners—to say nothing of the chaos visited upon those who manage their own. But investors using personal computers are building and tracking their portfolios before any more money is actually invested.

### 72 ADVANCED **A PROGRAMMING PRIMER—PART III**

*By Leon Starr*

The last in our three-part series, this article explores simple programming problems and illustrates the kind of thinking that is both useful and necessary when programming—the creative process of problem solving and the design of structured solutions.

### 79 PROFESSIONAL **HOLLYWOOD GIVES COMPUTERS THE BUSINESS**

*By Ray Loynd*

In an industry that's fickle, fast-paced and financially troubled, personal computers are being called on to test viewer response, speed up script writing, do research and cut costs.

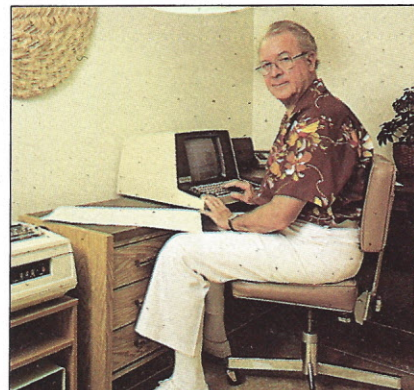
### 82 BUSINESS **COMMODITIES TRADING: THE COMPUTER EXCHANGE**

*By Ben Zander*

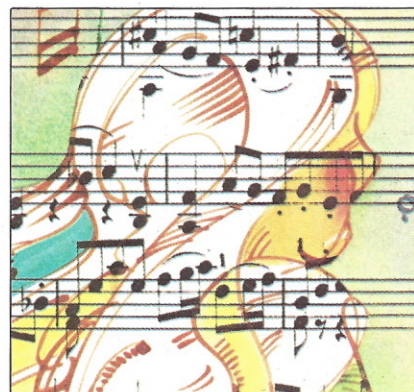
How high a risk should you take with those contracts for raw materials? The tangled operations involved in commodities trading are explained here, giving you the green light to successful investment via your computer.

PERSONAL  
 ANNOUNCES  
 NEW GENERATION OF  
**Name: CONCEPT**  
**Date of Birth: 1982**  
**Height: 16 BITS**  
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**Unique Trait: EASY INT**  
**Intelligence: PERSONAL**

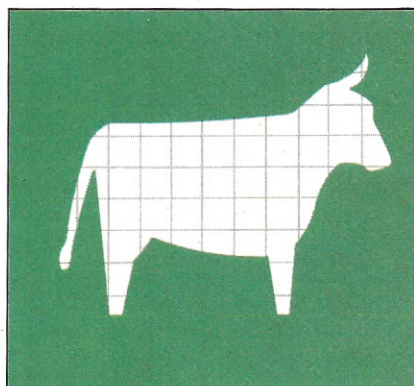
COVER



PAGE 43



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PAGE 82



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- Typewriter tabs
- Erase to end line
- Erase to end of page
- Self-test
- Monitor mode
- 4 strappable languages



## A Preamble To Change

**T**here's nary a publication on the newsstand today that isn't running articles on personal computing, telecommuting, artificial intelligence, declining U.S. productivity or advancing Japanese technology.

And rightfully so. These are the issues and trends confronting American business and society in the first years of this decade.

What hasn't been written is that these phenomena are not necessarily isolated; rather, they are emerging and interrelated catalysts that could push U.S. industry towards an economic comeback.

And when seen from that aggregate view, personal computing is the fulcrum of change. The availability and affordability of personal computers are making telecommuting a viable and oftentimes financially sound alternative workstyle. The rise in popularity of personal computers is turning R&D funding to refinements that improve the man/machine interface, netting computers that are smarter—an extension of human intelligence most often referred to as artificial intelligence. These same small and friendly computers are increasing corporate and personal productivity on all levels and in all applications. And U.S. manufacturers, venture capitalists, engineering talents and consumers are functioning synergistically to return the state of our technology to its original world-dominant position.

The editorial content of this issue overtures these changes. We went to Albuquerque to visit a man whose new product is a program that programs itself. Up until now, people have had to learn from their interaction with software, according to Jim Dowe of Excalibur Technologies (page 30). His software observes its own interaction with a human being

and learns from it. Based on what it learns, the software modifies itself to account for the idiosyncrasies of the human it is working with... a reaction Dowe terms "artificial intuition."

Our Essay, "How To Make Telecommuting Work," (page 38) started out as a section of our feature article "Would Working At Home Be Wise?" (page 42). But during the initial stages of editing, staff consensus was that the issue of how to successfully set up a telecommuting workstyle and how to successfully manage those workers is so important that it warranted additional research, coverage and essay treatment.

This same research also got our curiosity aroused in another regard: Telecommuting is looming on the work horizon as an alternative work life, with the personal computer the embryo of this change. What do the crystal balls of industry participants and observers say about the coming generation of computer products? How will these products stack up when compared to those we own today? What role will artificial intelligence play in reality? Product reality? What will be new features? When will prices be lower? How will 16-bit processors affect software capability? Will computers lack keyboards? Our lead Outlook story, "The Tarot Of Computers," (page 20) presents the experts' views.

And our product feature (page 174) presents what may be those visions of the future in the product of today—the new Corvus CONCEPT. This computer uses the power of the 16-bit processor to make the machine easy to use—at least by the standards of this machine's predecessors.


What about those products that are more expensive, but available now for the computer user who is finding that he no longer has the

needed horsepower? Our research into this area of upgrading systems, "High-End Systems: The Price Of Power," (page 52) found us unearthing quite a can of worms for those people who attempt to upgrade a system without fully understanding the hows, whys, whats and whens of such purchasing decisions. We were also astounded by the amount of products available for such upgrades; hence, the "High-End Systems Buyer's Guide" (page 103).

At this point in the editorial process, when we checked the balance of our coverage, we were somewhat weighted toward those readers who were fairly advanced in their use of computers. To round out our focus, we decided our presentation needed more information for those of you who have just jumped into the computer movement. "On Buying A Personal Computer" (page 123) remedies this by offering factual information on that potentially paralyzing first-time buying experience—information that applies to upgrade purchasing, as well.

Our software-market watchers informed us that the proliferation of portfolio-planning software is great enough to merit some attention, which we give it in "Planning Your Portfolio Personally" (page 62). And for those investors who favor the high-risk/high-reward investment style, the word on commodities appears on page 82.

Our final overview of this month's editorial package pointed up one last but all-important omission: fun in the computing life. "Keyboard Charisma—Making Music By Computer" (page 58) and "Hollywood Gives Computers The Business" (page 79) solve this problem.

We hope you enjoy your reading as much as we enjoyed serving it up. 





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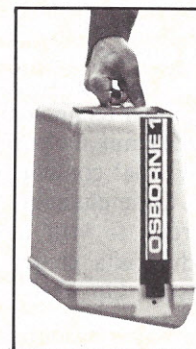
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## COMING ON-LINE

As you probably know, the January 1982 issue of *Personal Computing* was produced in braille as the "Magazine of the Quarter" by the National Library Service, Library of Congress. I am enjoying reading this issue. However, it is probably the only one I will ever see under current conditions. This situation illustrates a problem which is of special interest to me. So, if you will tolerate my briefly ascending my favorite soap box, I would like to bring this problem to your attention and the attention of your readers.

Blind people are in a state of chronic information deprivation. This is especially true for those of us with professional and technical interests. Most of the materials we need are simply not available in braille, or on recordings. So we are reduced to paying someone to read them to us. Imagine how interesting it is to hear a program read aloud! Even when the Library of Congress makes material available, like this issue of *Personal Computing*, it's their choice, not mine.

I believe that the computer is the answer to this problem. Every day more and more blind people are gaining access to braille or talking terminals, and many of them are personal-computer based. In fact, I am typing this letter on one. Incoming ASCII can be easily converted to braille or speech, thus eliminating the human intermediary reader or transcriber. For the first time we are reading newspapers through CompuServe, etc. I am considering trying to set up an on-line service especially for blind people, to provide them with any materials of interest that I can find in digital form.

I would be interested in any thoughts that your readers might have on this

matter. I would also be interested in knowing if there is any way that *Personal Computing* could be made available on-line. For example, is there a stage in the process of production from which a digital copy on tape or disk could be generated?

I can be reached by telephone at (202) 466-7890, or a message can be left for me on the HEX computer bulletin board at (301) 593-7033. (This system switches to baudot if it doesn't hear a response tone within about five seconds.)

Thank you for your attention.

Roger D. Petersen  
WASHINGTON, DC

EDITOR'S REPLY: *We are looking into this matter for you.*

## IN DEFENSE OF RS BASIC

The February issue of another personal-computer magazine carried a lot of copy about Radio Shack's Compiler BASIC. To say the least, the people who wrote the copy never had an understanding of the product, and in their lack of understanding, they misused it and then chose to abuse it. Hence, this letter to you. There must be some journalistic justice.

The gripe seems to be over compatibility with Level II BASIC. If you take the time to read a Radio Shack Catalog, they tell you about this. I quote the 1981 Radio Shack Catalog #RCS 4 1981: "Compiler BASIC, a powerful extension of BASIC, cuts program execution time. Features single-key ISAM, and easy debugging. Note: This compiler BASIC is not compatible with Level II or Model III BASIC, and is intended for program development and not for conversion of existing software."

The fact of the matter is that under all this smoke is a fire, and the fire belongs to Radio Shack. Thank God it's still burning. RS BASIC just may be the best thing that has happened to BASIC since Dartmouth University.

But there is also a lot of crying about the syntax difference. Give me a break. Every language has its own syntax, and this is a new language. The most important thing that you find is if you make an error in syntax, a \$ shows up and tells you the exact location of the error. Let's see Level II do that. Furthermore, the software comes with a well-written manual, and if you take the time to study it, as

you should, your errors will be minimal at worst.

RS BASIC is designed to compile in a disk-to-disk environment. This is extremely useful if your programs exceed the limit of available memory, and the single-key ISAM is worth the price of the software alone. The internal editor is limited, but this was recognized, and an out-board editor, "Bedit," was added to cope with the situation. This was good planning on the part of Radio Shack if you ask me. The editor has the ability to change large amounts of text with a single change command, like the one found on some mainframe systems.

In conclusion, it is my feeling that the product has been grossly misunderstood and misused. It is a fact that when we don't understand something, we tend to run it down.

Michael J. Mgrdichian  
ELMWOOD PARK, NJ

EDITOR'S REPLY: *Enthusiasm such as yours warrants attention such as ours.*

## MISSED THE MAILING LIST

I was very pleased to read the article on mailing-list programs on page 76 of the January issue. With all the mailing-list systems available, it is a great service for you to have provided such a brief, clear comparison. However, your readers should be made aware of Envoy, one of the most powerful major mailing-list systems, which your article seems to have missed.

Envoy, which runs under the OASIS operating system, is a full-power mailing-list manager available from Integron Systems. It handles any number of separate mailing-list files of up to 65,000 records each (depending on disk storage capacity). Each record is automatically sorted in both ZIP code and last name order, and each is made up of the full name (last name, first name, title, and nickname), company name, full address (street, city, state, ZIP code, country), date, and 20-byte category field. Entries, updates, deletions, and full-text searches are carried out with total flexibility and ease from a single editing screen.

In printout, all printer parameters—left margin, labels per line, spacing, etc.—may be specified easily in the printout screen. Ten standard printouts formats may be produced for specific ranges

(continued on page 132)

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# We have ways...

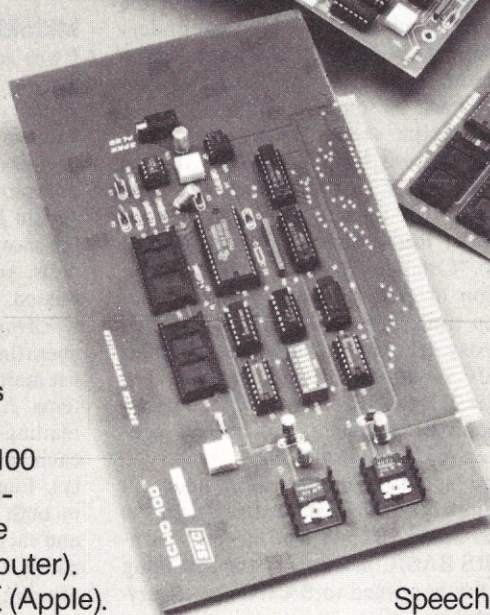
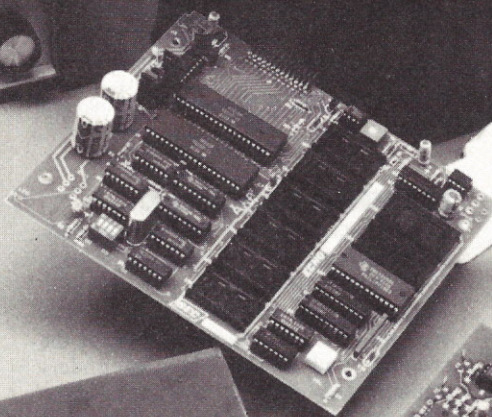
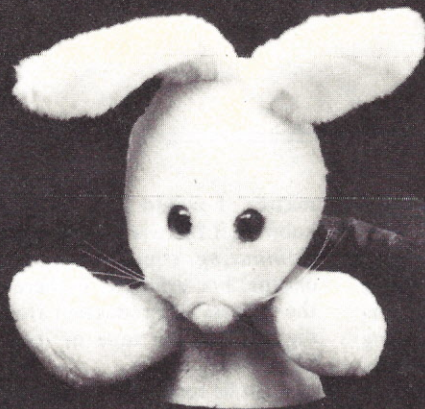
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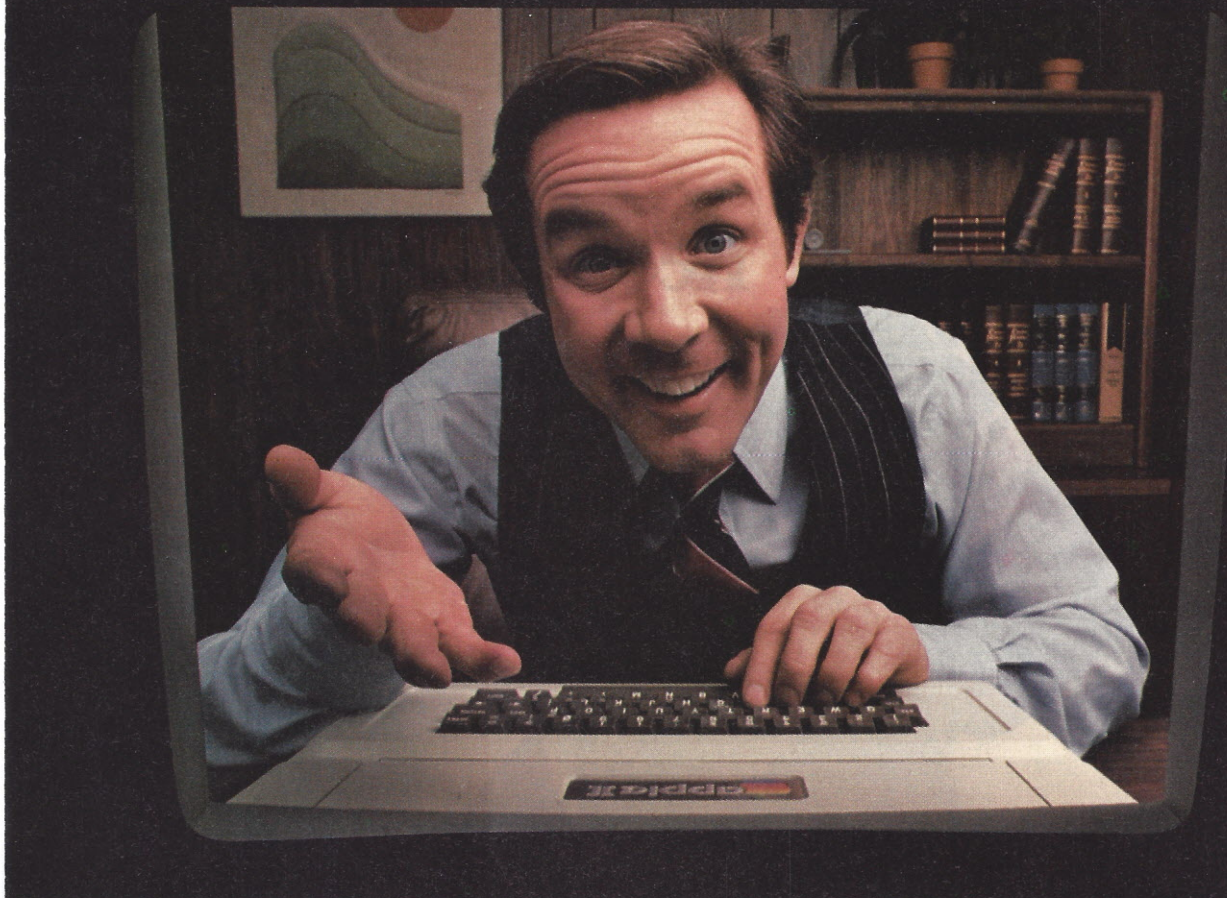
Speech applications are virtually unlimited, ranging from education to games to aiding the handicapped. The flexibility and low price of ECHO Speech Synthesizers make them the logical choice when adding speech to your system.

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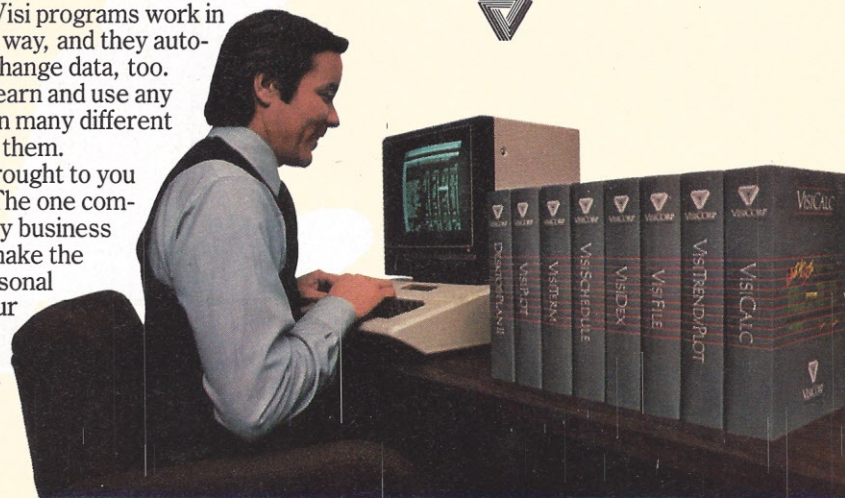
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Or teaching students “dry” subjects in game form (while they learn there's more to computers than intergalactic battles).

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<b>User Memory</b> 16K-256K bytes*	<b>Display Screen</b> High-resolution* 80 characters x 25 lines Upper and lower case Green phosphor screen*	<b>Color/Graphics</b> <i>Text mode:</i> 16 colors* 256 characters and symbols in ROM* <i>Graphics mode:</i> 4-color resolution: 320h x 200v* Black & white resolution: 640h x 200v* Simultaneous graphics & text capability*
<b>Permanent Memory</b> (ROM) 40K bytes*	<b>Diagnostics</b> Power-on self testing* Parity checking*	<b>Communications</b> RS-232-C interface Asynchronous (start/stop) protocol Up to 9600 bits per second
<b>Microprocessor</b> 16-bit, 8088*	<b>Languages</b> BASIC, Pascal, FORTRAN, MACRO Assembler	
<b>Auxiliary Memory</b> 2 optional internal diskette drives, 5¼", 160K bytes per diskette	<b>Printer</b> Bidirectional* 80 characters/second 12 character styles, up to 132 characters/line* 9 x 9 character matrix*	
<b>Keyboard</b> 83 keys, 6 ft. cord attaches to system unit* 10 function keys* 10-key numeric pad Tactile feedback*		

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## On Service, Expansion, Ergonomics, Jargon, And Persuasion

**I**n this monthly column, "Answers," we will respond to your most frequently asked general questions about personal computing. Please send your questions to: Answers, Personal Computing, 50 Essex St., Rochelle Park, NJ 07662.

**Q:** I want a personal computer. How do I convince my manager to OK the purchase?

**A:** It's best not to force him to decide unless you're sure he'll say yes. Curb your enthusiasm. Better yet, get him to suggest the purchase against your presentation of all the reasons he might have against it—as if those fears were your own—and let him pull you into the future.

For instance, you may present a strong case for adding an employee whose job description matches the computer's abilities. You could mention in passing that perhaps a system could do the same thing, but...it's a little radical for your company. This is as difficult as catching the craftiest old trout in the pond. But by proposing the purchase to him as an alternative instead of what you want, you win either way. If you get the extra employee, you'll get the help you need. Then you can get a cheaper system for your home and can pursue your competency there. But the computer will turn out to be less expensive, and you can put your boss in the position of talking himself into it.

A desire to save money is probably the most universally shared managerial trait, after all. And if you do your homework, here's where reason and facts—such as payback on investment, tax credits and lessing arrangements—can come in, especially when the costs include the red tape and benefits packages, and when

the time needed to get the system running can be equated with employee training time.

Another ploy is to convince your secretary that you need a computer, if she'll use it too. She'll convince your boss's secretary. Then your boss will end up buying two systems.

This entire subject can fill many books, starting with Machiavelli's *The Prince*, and moving through James L. Adams' *Conceptual Blockbusting*. But you're logical. You can find the needed persuasion tactics, right?

**Q:** Should I get a service contract with my computer, and what kinds of service are available?

**A:** The answer to the first part of your question is a strong "maybe."

There are first, second and third-party service contracts. The manufacturer's warranty could be called the first kind. Some manufacturers, like Apple, also offer an extended warranty, and some offer long-term service contracts after the warranty expires. Entering a first-party agreement would make sense if all your hardware carries the same brand name.

Second-party agreements come from your dealer. This arrangement can work if you bought everything from him, and he's got a good service department. One hitch here is that with the market growing so quickly, successful dealers can be swamped just selling and installing; the personalized service you got a year ago may be evaporating now, or next year.

Third-party service comes from service-only organizations, or service-only divisions of large, diverse firms. These include GE, RCA, Sorbus, TRW and Western Union. Since we

don't know how good your local dealer is, and third-party groups are the most mysterious, we'll focus on them here.

Third-party contracts tend to be limited to your hardware. They cost plenty, but they offer plenty. TRW, for instance, charges from nine to 15 percent of the selling price of your equipment per year. The variation depends on things like how reliable they think your equipment is, and how often you use it. Electro-mechanical gear like printers get a higher rate than CPUs; motion equates with wear. For an \$8000 system like a Vector Graphic with an NEC Spinwriter printer, figure on about \$90 to \$95 a month.

For some people that's a figure to gulp at, because they may not know how reliable computer systems are. Service organization sources say that each system fails an average of two to four times a year. New users may experience more failures because of their own mistakes, which they would rather see as system failures. Also, they may have software problems they think are hardware glitches.

For those who want to do repairs themselves, diagnosis can sometimes be more time consuming than repair. Tracking a failure down to a particular subsystem can be hard and misleading, especially if the suspect part is shipped off for repair, and comes back still not working. Plus, some components don't wear well when shipped. Hard disk drives are thought to be especially susceptible to damage due to rough handling.

Those who opt for a contract are still on their own with software, unless they want to get into one of the mainframe/mini companies like DEC, that offer comprehensive systems and contracts (and prices). For the rest of us, it means keeping



on good terms with dealers. Professional-level software suffers from breakdowns as well, and backup diskettes are crucial for businesses. They're being constantly improved and revised, so it's really important to send warranty cards in. Even on hardware-only contracts, there is some software help available.

The real virtue of third-party contracts is the swap. Service organizations make money by not having to call on you more than once for a given repair job. They do this by exchanging your non-working unit with a working one from their stock of spares.

Third-party service comes in levels. Deluxe service means they come to you as needed. Some large-scale end users vary this by doing their own swaps, shipping all the non-working equipment to a central location and having the third-party organization come to that location periodically to take care of all the systems.

Economy-level service requires that you take the system to a service depot. This costs less, and if you're a long way from the nearest depot, it could be the only cost-effective way to do it. Or you can do it via Greyhound parcel service if you're in another city. Some service organizations will pick up your unit and put the replacement on the next bus out. This could be your only hope if you work in Iliad, Montana. Different depots have different varieties of products they support, too.

You can't just go out and put together whatever system pleases you, and then expect your Obscure 39 printer to get written into a service contract. TRW currently services computer systems from ADDS, Commodore, Cromemco, Digilog and Vector Graphic. It supports CRTs from ADDS, Ampex, DEC, Hazeltine and Texas Instruments. It also supports printers from Anadex, Dataproducts, DEC, NEC and Texas Instruments. It's not that other prod-

ucts aren't reliable, but TRW believes these work well enough that service contracts can be profitable for them without costing the user too much. There's also a limit to how many products their servicemen can be trained on.

**Q: What do I need to understand the problems relating to system expansion?**

**A:** First of all, you should look for a definition: Expandability means never having to trade in your system because you can add the capabilities you have come to need.

Maybe your business is expanding rapidly, yet you can't afford to bury your working capital in a strong, good-for-about-two-years system, and you prefer not to lease. You should then consider expandability. Moreover, future user-friendlier software is very likely to need larger memory than is now common. It would be wise to allow for this larger memory.

And that brings up the first principle of expandability: software. Expandability is almost always hardware-defined. For you, the user, it should be software-defined. Always ask yourself: "Will this future add-on hardware help me run the kinds of software I'll want?"

Other areas of expansion that you should examine include: added active memory, or RAM; added storage memory, usually on disk; the ability to add specific applications, like voice synthesis and/or recognition, and controlling and/or reading instruments; the ability to add workstations by networking multiuser terminals or multiprocessor architecture (adding a processor card to the CPU each time you add a terminal); the ability to tie into particular mainframes; and the ability to update gear as future advances are implemented.

Systems with built-in expansion slots can often, though not always, be updated most easily. But just because

the slots are there doesn't mean the power supply or cooling system can handle a multitude of hot, power-hungry boards. Make sure your dealer will guarantee that your system will run reliably in the ultimate configuration you have in mind—before you buy. Overloaded systems have a maddening tendency to half-fail; like any overburdened worker, they get ulcerous and mistake-prone. Power supplies and add-on boards have power ratings. Make sure the totals match!

Your old software may not recognize your new hard disk drive a being more than another floppy unless it's altered. Make sure you know how that will be accomplished to avoid midnight hair-pulling sessions. Moral: Every expansion has consequences.

There are also levels of trouble one must deal with to accomplish these expansions. An Apple II can be turned into a competent business machine with readily available boards, an expansion chassis, a fan, motherboard modifications (chip replacements), add-on switches, etc. A new HP 87, for instance, can be expanded by popping cartridges into slots in the back. Each cartridge will do yoeman work, and each has distinct advantages. You or your dealer must be prepared to do a lot more fiddling to get the Apple there, though (that's why Apple Computer made the

Upgrading a machine like the Apple II when an already upgraded version is available from the same manufacturer brings up another principle of expandability: single-vendor responsibility. In many cases you can't expand a given machine without going to several vendors.

**Q: What is ergonomics, and is it really scientific?**

**A:** Ergonomics is the study of the man/machine interface. It's also one of the words of 1982. Use it

(continued on page 17)



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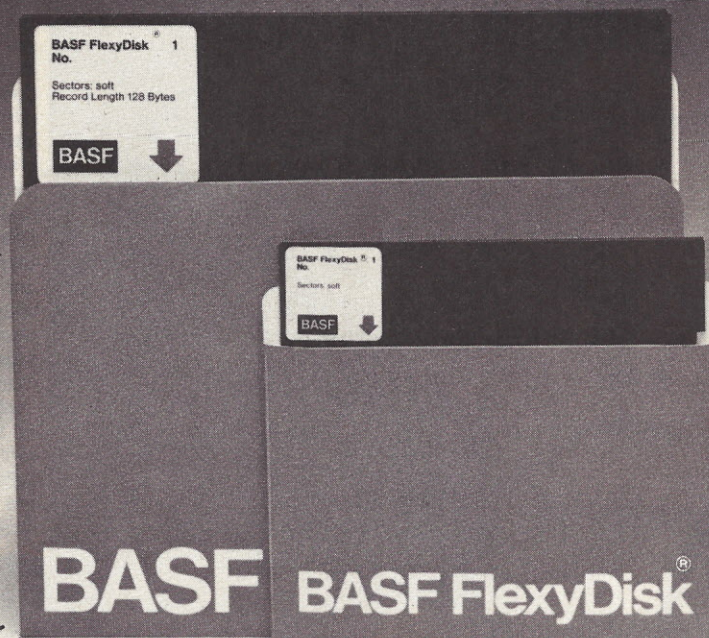
CIRCLE 8

May 1982 PERSONAL COMPUTING

15



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## BASF

Floppy Disks Mag Cards Cassettes Computer Tapes Disk Packs Computer Peripherals

CIRCLE 9



## ANSWERS

(continued from page 14)

frequently to prove you're au courant. It comes from ERGON, Ancient Greek for "work." It's not in the 1936 Merriam Webster Collegiate Dictionary, but it is in the 1977 edition. What happened in the interim was a burgeoning awareness of how form affects function.

*But is it scientific? Does form affect function?* Well... basically, yes. That is, it can be demonstrated that improvements in the man/machine interface can help productivity. What constitutes "improvements" is still up for grabs in many cases.

With computers, manufacturers seem hard-pressed to cite actual scientific studies of ergonomic factors. But that hasn't kept many of them from touting the ergonomic qualities of their wares. There are two or three reasons for this. With more firms crowding into the marketplace and superior qualities appearing on more machines, sometimes ergonomics are the only factors you can use to tell one system from another. Some of these qualities may make the machine slightly more pleasant to use, but they probably have little actual impact on productivity. Further, one abominable deceit found in other industries—the illusion of ergonomic qualities—may find its way into computing. Car manufacturers are famous for making cars that look racy and comfortable and aren't. Sometimes only hard use reveals a clever illusion, because we tend to trust our eyes more than our tactile senses.

Ergonomics in computers can be demonstrated scientifically—but generally hasn't been. Heavy users will discover this—perhaps the hard way; light users may never. Also, hunt-and-peck typists don't usually care whether their machine has a Selectric- or Teletype-style keyboard, or whether the home keys have little home-key-finding bumps on them that could drive typists crazy if

(continued on page 130)

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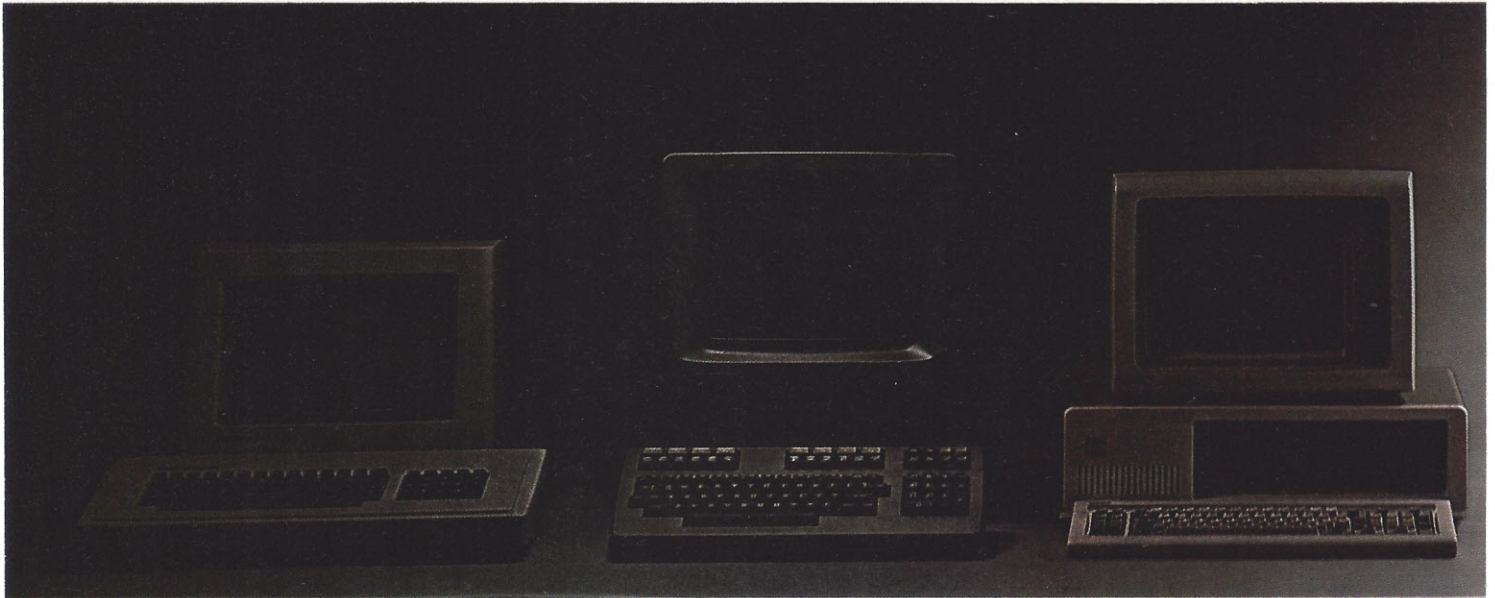
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Since all Apple III languages use SOS, they share a common disk format. So Apple III programs can merge and communicate—a Pascal application program can directly access a BASIC text file, for example.

Xerox 820	Hewlett-Packard 125—Model 10	IBM Personal Computer	Apple III
Standard Memory			
64K	64K	64K	128K
Maximum Memory when fully configured*			
64K	64K	192K	256K
Expandability			
No expansion slots	No expansion slots	No extra expansion slots in fully configured* 192K system	4 extra expansion slots in fully configured 256K system*
Diskette Storage (per drive)			
92K	256K	160K	140K
Mass Storage (per drive)			
—	4 megabyte Hard Disk	—	5 megabyte Hard Disk
Display Graphics Capability			
High resolution B/W	High resolution B/W	High resolution B/W or 4-color (color requires additional card)	High resolution B/W or 16-color
Software Available			
Word Processing Super Calc®	Word Processing VisiCalc® 125	Word Processing VisiCalc®	Word Processing VisiCalc® III
—	Business Graphics	—	Business Graphics
Communications	Communications	Communications	Communications
—	—	—	Apple II software library
CP/M® library	CP/M® library	CP/M® 86 programs	CP/M® library (available Spring, 1982)

\*"Fully configured" means system includes, at minimum, monitor, printer, 2-disk drives and RS-232C communicator. NOTE: Chart based on manufacturer's information available as of December, 1981.



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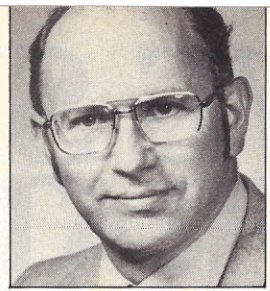


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## OUTLOOK

Bob Katzive of Gnostic Concepts feels that the expandability of 16-bit machines will cause companies to manufacture inexpensive computer add-ons, and this competition will create downward price pressure.



### THE TAROT OF COMPUTERS

**T**here's a new generation of personal computers on the horizon, powered by 16-bit microprocessors and distinguished by easy-to-use features.

But while most industry watchers agree that there is indeed something shifting in the personal-computer field, their analysis of just what that something is is colored somewhat by the background and prejudices of the person discussing the phenomenon.

Tripp Hawkins, for example, director of marketing for Apple Computer's personal office system division, says the new computer generation isn't here yet, but will be in a couple of years. Industry seer Ben Rosen, president of Rosen Research, on the other hand, says that a product change will be taking place this year, with the introduction of new computers that will be very different in their human-interface capabilities and portability.

Opinion, though, isn't unanimous about just what the next generation will look like. For while Rosen and Hawkins talk about new features, Jon Shirley, vice president of computer merchandising for Radio Shack, and Kit Spencer, marketing vice president for Commodore—both of these companies have fielded low-cost machines clearly aimed at the home market, the Color Computer and the VIC 20 respectively—assert that the next move will be the assault on the price barrier in personal computers.

The truth probably is that both avenues will be followed over the next nine to 12 months, and that firms will be both adding features in some new models, aimed at high-end use, and cutting the price of others in the lower end as competition heats up. For now, as always before, the industry is being driven by the availability of more powerful, but less and less expensive semi-conductors.

Sixteen-bit processors have been used in mini-computers for some time, but their incorporation into personal computers had to wait for the development of single-chip processors, which have a wide bit path. These chips will appreciably improve the personal computer. Apple's Hawkins, for example, notes the importance of these processors' larger memory-address space. The memory-address space directly affects the software capability, and as Jon Shirley points out, "The end user will see the benefits of the 16-bit processor through the software only. We will be able to create software that more directly addresses the man/machine interface."

#### *The pundits*

If those inside the personal-computing industry seem unclear about the future direction of the industry as a whole, the outsiders—who are watching the insiders—seem no more undivided. For example, Bob Katzive,

program manager for Gnostic Concepts based in Menlo Park, Calif., says that the tremendous expandability of the 16-bit machines will cause many small companies to manufacture relatively inexpensive computer add-ons. That competition, he feels, will create downward price pressures. The net result will be "more bang for the buck," rather than reduced overall system cost, because, "the investment [required for development of a 16-bit machine] is much more than [that required] for an 8-bit machine."

Rosen seconds that motion, noting that the cost of the semiconductors, the main computer hardware cost, is about as low as it's going to get, but that the continually increasing power of silicon will provide about twice the power of today's machine but at about the same price.

And Edward Cherlin, director of personal-computer research at Strategic, located in San Jose, Calif., says that another advantage is the provision of more room for programming languages, like Pascal, with the larger processors. Such languages, "now have sufficient room to include all features without arbitrary limitations," Cherlin says. "So some very large graphics programs now running on minis and mainframes can be recompiled to run on personal computers."

Cherlin says Smalltalk is one of the greatest benefits of the 16-bit processors. That's a RAM-hungry language developed by Xerox that springs from the desire to make the machine/person interface as easy as possible. "The command interface is very easy—multiple-window display, multiple-menu bars associated with each window. And instead of cursor-control keys, the user gets a mouse (a small device that rolls on a table top that controls similar relative motion of the cursor on the screen) or a joystick or a touchpad for commands."

#### *Practice your typing*

The subject of mice brings into focus what many have called a real barrier to the expansion of personal-computer use—the need to use a keyboard. Most people who could really use personal computing, the argument goes, have no desire to type. So some other means of man/machine communications needs to be found. That other means, however, doesn't seem to be any nearer with this new generation of computers.

Radio Shack's Shirley, for example, says "There are a number of applications where you'd like to get rid of the keyboard, but it's still a pretty efficient device for doing a number of things. Until you get to a high level of voice recognition you're going to have keyboards."

But Commodore's Spencer says that he "wouldn't want to sit in an office where there are 15 people talking into their machines. There are ways to supplement the keyboard," he says, "but it will remain a key item for many years."



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These opinions are voiced despite the fact that as Apple's Hawkins says, "Management people want to make sure they aren't thought of as typing their own letters. They want to separate the creation of data from its analysis."

But there are difficulties. Says Strategic's Cherlin, "It would be easier if we adopted a true phonetic, written language. But we won't even adopt metric measurements."

If, as Shirley suggests, voice recognition is included, people might see computers as intelligent. But Katzive from Gnostic thinks that could be a problem, for then people might start to fear the very machines that are supposed to help. Nevertheless, Katzive and Cherlin both look for artificial intelligence in personal computers in this decade—although not in the next few years.

So the details of the next generation of personal computers are cloudy, despite the fact that some of its members are already on the scene, like the Corvus CONCEPT (see page 174 in this issue).

Apple's Hawkins says the new era will be focused on the personal-computing concept, with more computing power dedicated to one user. And he stresses inter-machine communications. "People won't buy a personal computer unless it has a lot of ability to talk to other computers, large and small."

But Shirley from Radio Shack and Commodore's Spencer champion the other axis of advance—the price barrier. And, says Spencer, "We'll see some very interesting applications coming out for things like the VIC 20 (and, one would think, similar machines like the Color Computer, the Atari 400 and the TI 99/4) and they won't be the jobs that were traditionally done by the computer."

## COMPUTERS ON THE AM DIAL

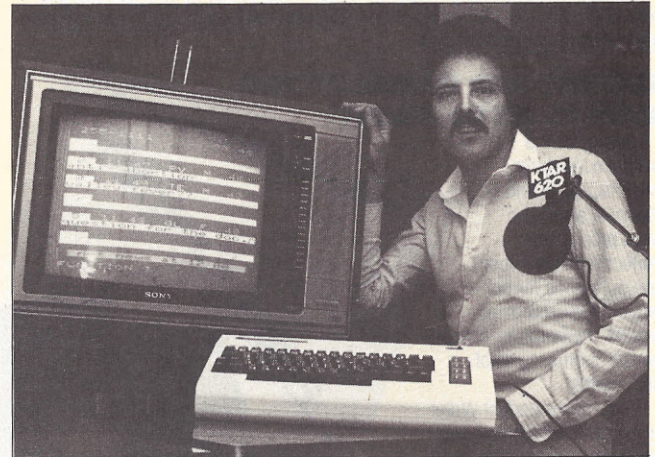
**W**hen you hear a list of credits at the end of a radio show, do you ever wonder what the jobs of these behind-the-scenes people entail? For instance, what does a producer do? Well, the producer of a talk show is responsible for hiring the show's guests. During the show, his job is to answer the phones and screen callers. Could a personal computer help him perform better? You bet, says Tim Greer, a radio announcer with KTAR, an all news and talk radio station in Phoenix, Ariz.

Greer, on request from the station's management, designed a program called Talkscreen for his VIC 20 personal computer. This program eases the workload of the producer and the talk show host. KTAR uses the VIC with a cassette recorder, a printer and three TV monitors—one each for the producer, and the talk show and sports call-in areas.

As each call is received, the producer enters pertinent information about the caller into the computer—his sex, age, what part of town he is calling from, and what his

question or comment is. After the information is entered, it is all displayed on the screen with the time the call came in and when it was put on hold.

This information helps the show's host choose the caller he wants to speak to next. "Before, it was basically Russian Roulette," Greer says. "Now we have the ability to program the talk show. As competition has increased on



Radio announcer Tim Greer programmed his VIC 20 to ease the workload of his station's talk show hosts and producers.

the AM dial, we have found that we really need to pay very close attention to programming."

Because the show is live, access to caller information has to be quick and easy, and the color capabilities of the VIC 20 have been a great asset for Greer. The computer is programmed to display all of the ages in one color, all of the parts of town in another, and so on. In this way, the host can easily pick out what characteristics he wants his next caller to have and also what kinds of questions will fit into the program.

Greer has also programmed a real-time clock into Talkscreen for messages from the producer to the talk show host. When the producer hits the enter message key, the real-time clock at the top of the screen reverses in color. This reverse in color stands out and tells the host that there is a message coming up—there is something there that he needs to look at. When the message is completely entered, it is displayed at the bottom of the screen in a bright color and the time returns to its original color.

Another advantage of the VIC 20 in Greer's mind is its 22-character readout. "If you had an 80-column readout, the monitor would have to be very close to the people who are reading it. Any distance at all and you wouldn't be able to see the tiny characters," he says. There would also be a tendency to try to put too much information on the display. "You are talking about a person who is sitting in a room with Vincent Price and the host is already



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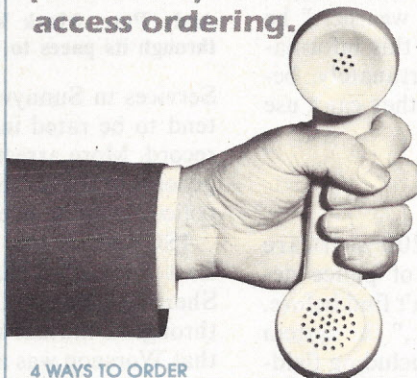
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## OUTLOOK

nervous—he's got a show to run—he really doesn't have the time to constantly read a full screen of information."

Because they are using a personal computer, the staff of the radio station can also use the VIC 20 to store the demographic information of the callers. It then prints out the information for the station management. "No radio station is everything to everybody," Greer says. "By gathering this information and analyzing it, the station is able to tell what areas they should try to concentrate on."

Greer describes himself not as a programmer but as a "tech freak." "I love to see applications work," he says, "and I've got a lot more ideas." One of his ideas is a sports program that he calls Sportscreen, and it would be used by play-by-play announcers at sports events. "Right now they pass the stat book around and people whisper in their ears. With this program, all of that information can be displayed right in front of them, constantly, as the game goes on," Greer says.

He is also working on an application that computerizes the control room of a music station. All of the "live" copy, promotional material and public service announcements will be on the CRT in front of the disk jockey. This will avoid the paper shuffle. "Hopefully, we will be able to implement this with a touch screen rather than a keyboard to make it absolutely and totally as simple as possible," Greer says.

Still another Greer idea is a service called Datapad, which is along the lines of the CompuServe or The Source networks. The service will be an entertainment data base sponsored by the local radio station in each major market. "No matter what city you go to, you can access the Datapad with your terminal and get entertainment information—restaurant specials, restaurant reviews, concert information, and local sports and weather," he says. "The station normally handles all of this information on a day-to-day basis anyhow. Unfortunately, because of how tight formatting has become, they can't use a lot of it."

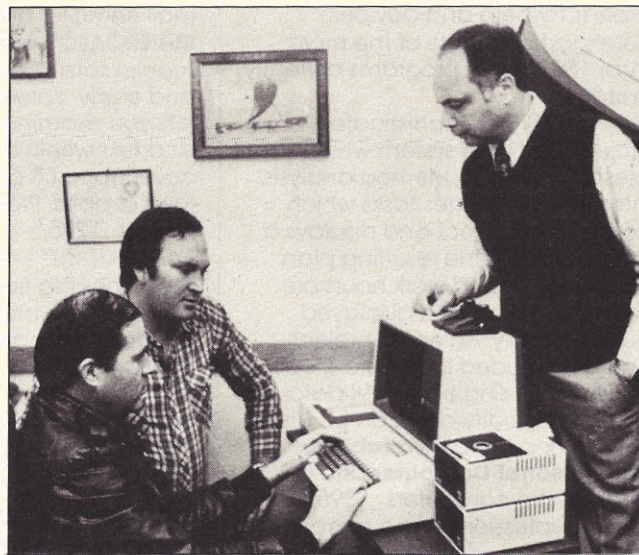
### COMPUTERS POLICE THE PENINSULA

Using an Apple computer and a \$200 software package, a rapidly growing number of police departments are finding criminals they couldn't find before. To single out the "crook most likely to . . .," the system rifles through thousands of pieces of data including field-investigation reports, partial descriptions of license-plate numbers, and a suspect's hair color and method of operation (MO).

Using this system, called ISCARS (Information Storage Correlation and Retrieval System) from Mark Worsnop of XX Custom Software in Woodside, Calif., policemen have made arrests that they would not otherwise have been able to make. One case in point involves

two shoestore burglaries that occurred in Palo Alto, Calif. The only clue the police had was a partial license-plate number. The state computer system could not search for partial plate numbers, but the Palo Alto Police Department's Apple II could. An officer had already associated a suspect with the car in a field investigation, and the report had been filed in the system. The computer displayed the suspect's file and the department had his photograph. The photo was then put into a photo lineup and the victim gave a positive identification. Bingo. The criminal couldn't believe he'd been caught.

User acceptance of ISCARS has not been a problem. Andy Pate, a Planning and Research Officer with Police



Andy Pate, Mark Worsnop and Ken Franks put ISCARS through its paces to single out the "crook most likely to . . ."

Services in Sunnyvale, Calif., points out that policemen tend to be rated in large part on their "case-clearance" record. More arrests yield a higher rating, and ISCARS generates arrests. So departments using the system find police climbing over each other to get at it.

ISCARS is the brainchild of Lt. Ken Franks of the East Palo Alto Substation of the San Mateo County Sheriff's Office in California. Franks met Mark Worsnop through a mutual interest in boating. After discovering that Worsnop was a programmer, Franks started to think about asking his help in instituting computerization in the Sheriff's station. For example, officers carry their FI (field interrogation) books with them, and put them in their lockers when they go off duty. Franks asked Worsnop if he could write a program that would enable everyone to consolidate all of the FI information, and then search for leads. Since neither of the men had a personal

(continued on page 146)





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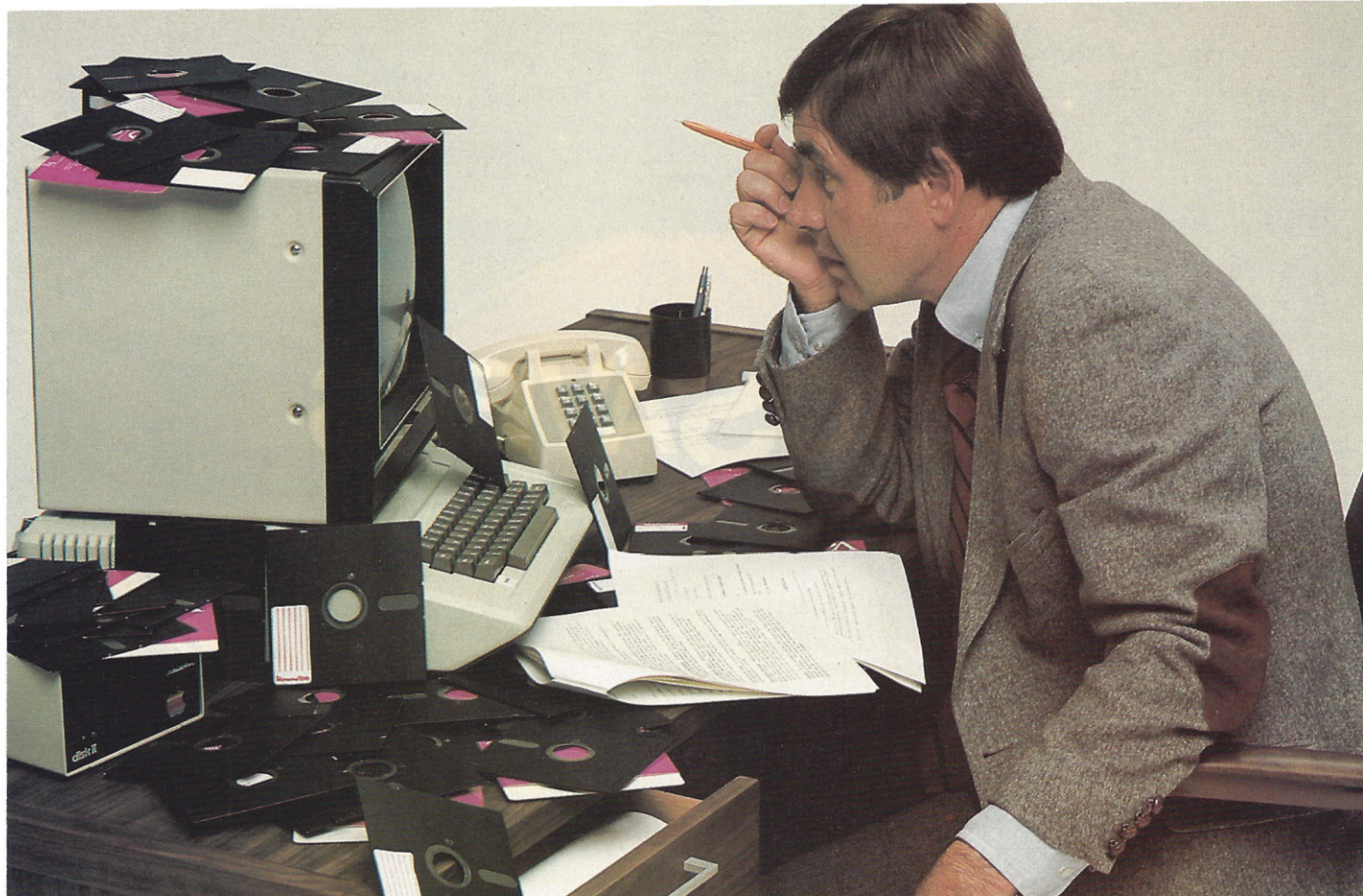
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## A PERSONAL COMPUTING Interview With Jim Dowe

**H**e seems a very ordinary man, but Jim Dowe, president of Excalibur Technologies, has hit upon a development that is decidedly extraordinary.

*Dowe, a native of Texas, has parlayed his studies of computers and artificial intelligence into a product that seems, to the uninitiated, to think. He calls the concept artificial intuition.*

*Personal Computing went to Albuquerque, New Mexico, the home of Excalibur, to speak to Dowe about SAVVY, his brainchild, and about artificial intelligence (which he says SAVVY isn't) and the future of easy-to-use computing systems.*

**PERSONAL COMPUTING:** You have a product that seems to think. Does it really?

**Dowe:** I don't know how to answer that question, because the concept of "think" means different things to different people. I think of the machine and its capabilities. The point is not whether it thinks or not, but that it

assists me in doing things quicker than if I didn't have that machine.

**PERSONAL COMPUTING:** What exactly does SAVVY do?

**Dowe:** It compares an incoming pattern with other patterns that it has in its memory, and then says, "Of all the things I've ever seen, which of those things is most like this new pattern that I have." And then it does what it should based on that match. It does this through pattern recognition, the ability to place a new experience into the context of previously learned experience.

**PERSONAL COMPUTING:** So this product is able to make value judgments?

**Dowe:** It makes value judgments based upon the values of the human who trains it.

**PERSONAL COMPUTING:** Do you mean this machine learns?

**Dowe:** Yes, it learns.

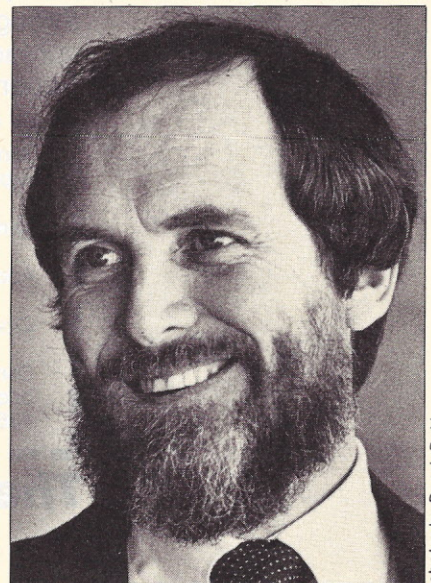
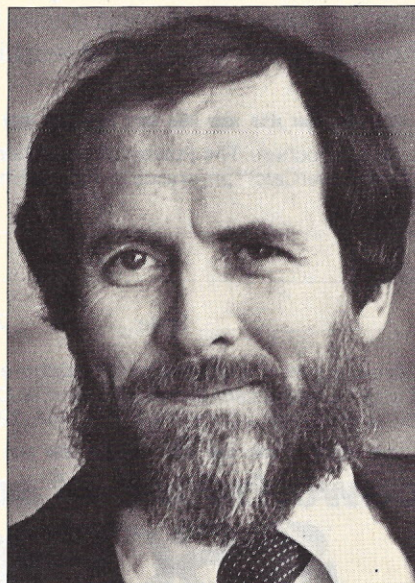
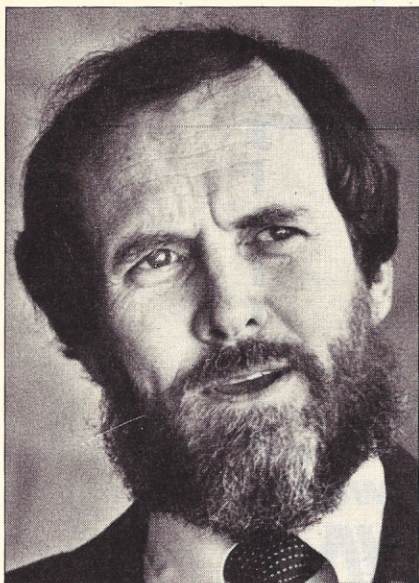
**PERSONAL COMPUTING:** How does it differ from other computers? Doesn't a computer learn through a program?

**Dowe:** As it stands, the software used in most personal computers and on most mainframes is very unforgiving and it doesn't learn from its interaction with humans. The human is forced to learn from his interaction with the software. We've changed that. The software observes its interaction with a human being and learns from it. Based upon what it has learned, the software modifies itself to account for the idiosyncrasies of the human it is working with.

**PERSONAL COMPUTING:** Then you're approaching computing from the opposite direction?

**Dowe:** Yes. We are approaching it from the perspective of those individuals who are primarily right-lobed—people who want to solve a problem, and not learn how the tool works. They want to be able to use it immediately. When that's the case, the machine must learn very quickly how to adapt to the individual, instead of forcing the individual to adapt to it.

**PERSONAL COMPUTING:** You used the



photos by Dennis Dahl



term "right-lobed." Can you tell us briefly what that means?

**Dowe:** Some research has shown that analytical decision-making capabilities resides in the left half of the brain, while intuitive capabilities reside in the right half, or the right lobe. Right-lobed people make intuitive decisions, while the opposite type person makes analytical decisions. Of course, no one really fits into one of those extremes or the other. We fall somewhere in between them. But on the left extreme are those people who make analytical decisions—by following the rule. The right-extreme people make intuitive decisions—decisions made on "gut feel."

**PERSONAL COMPUTING:** A person who makes intuitive decisions would be one who puts a screwdriver in a screw slot because it just has to go there, right?

**Dowe:** Right. But he's not about to sit down and read a manual to figure what it's all about. SAVVY works in an intuitive manner like this.

**PERSONAL COMPUTING:** So SAVVY takes most of the burden of learning off the user?

**Dowe:** Right. For example, there are a lot of people who really like the results VisiCalc can give them. But they're not willing to invest the time it takes to learn how to use VisiCalc, although they really like the results.

**PERSONAL COMPUTING:** How long does it take to learn to use VisiCalc?

**Dowe:** Well, it's a function of how much you know about computers. It may take as little as four hours, or as many as 20 hours. If a person is really intuitive, he just doesn't want to spend those hours. He wants to do it right now. And that's what we are working on. We can shorten that learning time to 15 or 20 minutes.

**PERSONAL COMPUTING:** Can you explain how SAVVY uses intuition to help the non computer expert learn computers?

**Dowe:** Well, after it works with a

particular individual for a while, it picks up that individual's mannerisms and usages of the language. Then when it's queried, the machine will answer using the words it learned from the human who trained it. For example, if a dyslexic individual uses the machine, then the machine will communicate like a dyslexic.

**PERSONAL COMPUTING:** But haven't large computers done this before? I'm thinking particularly in the area of computer chess, where programs learn from the moves in the game that have already been made.

**Dowe:** We use the same philosophy that those computers use, but the implementation is radically different. As I said, we're using a small, 8-bit machine with 64,000 characters of main memory to do pattern recognition with a sophistication that many people find difficult to believe can be done on any size machine.

**PERSONAL COMPUTING:** It sounds like this is the breakthrough that people have been waiting for in computers. Is this the technology that will bring computers to the point where everyone can use them?

**Dowe:** I don't know if it's a breakthrough or not, but I feel like it's a major step forward. Clearly this will allow people who before could not or would not use computers to use them—without having to learn BASIC or some other language.

**PERSONAL COMPUTING:** Does this mean programmers won't be needed anymore?

**PERSONAL COMPUTING:** Do you think of SAVVY as "artificial intelligence?"

**Dowe:** Not in the classical sense. I think artificial intuition is a much better pair of words to describe what's going on. The process that SAVVY uses is really not an analytical one. Of course, we have to use the tools that exist to implement SAVVY, and those tools are analytical in the sense that they use bits and such.

But in the classical sense of artificial intelligence, SAVVY is not analytical in any way, shape or form. For example, SAVVY does not care where the bits come from that are put into the memory. So SAVVY will recognize speech as well as extracting meaning from text, with no changes to SAVVY itself. With artificial intelligence the structure and the syntax are extremely important. This is not the case with SAVVY.

**PERSONAL COMPUTING:** That must make SAVVY a very smart machine. How will it be distributed?

**Dowe:** Our total production capacity for the models that will run with the Apple computers has been purchased by American Business Computers, which will market SAVVY.

**PERSONAL COMPUTING:** Do you know roughly what it will cost?

**Dowe:** Roughly, it'll be less than \$1000, and some prospective customers who have evaluated it have estimated that it will pay for itself in programmer time alone in one to two weeks.

**PERSONAL COMPUTING:** It's almost a postulate these days in the computer business that the software is double the cost of the hardware in any turn-key system. Will SAVVY make a dent in this huge software cost?

**Dowe:** Yes, there will probably be a dramatic drop in systems prices.

**PERSONAL COMPUTING:** So SAVVY will make it easier for people to use, and to buy, personal computers?

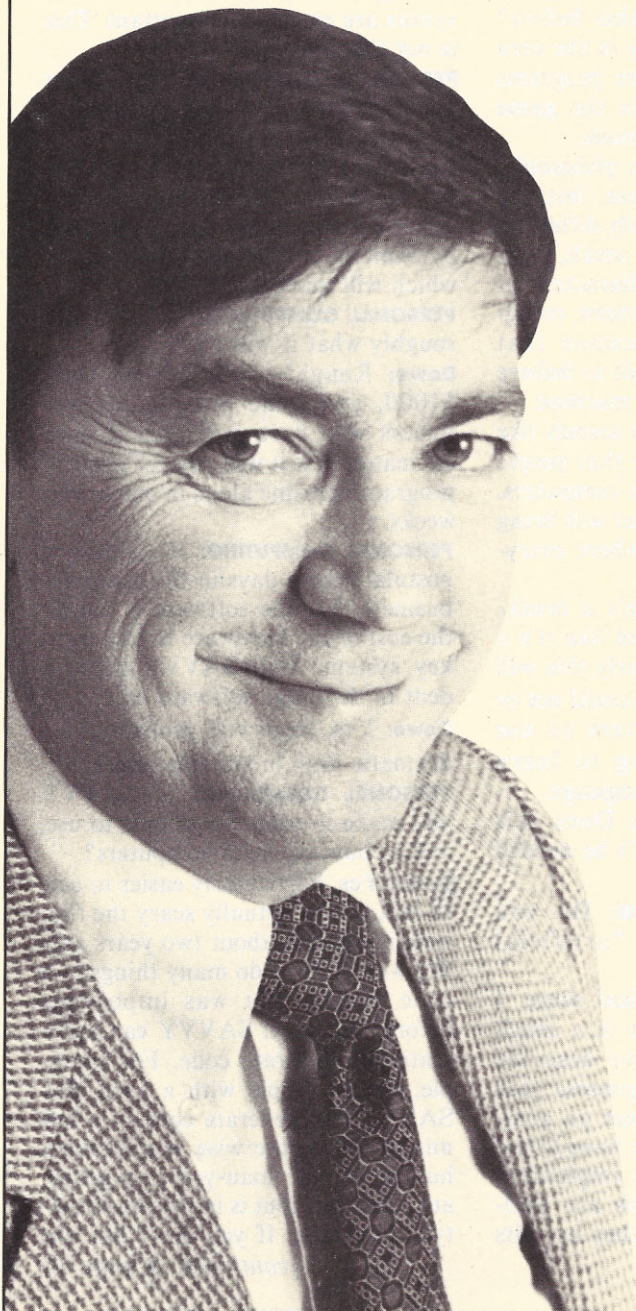
**Dowe:** Yes. Particularly easier to use. In fact, it was actually scary the first time it worked, about two years ago. We were able to do many things in a time period that was impossible before. But now, SAVVY can automatically generate code. For example, on the Apple with a hard disk SAVVY can generate code in a few minutes that otherwise would take a human several man-years to generate. And the input is in simple, street-type language. If you don't like the

*(continued on page 86)*



We didn't tempt him with gifts.  
Or make him a deal.  
We couldn't even vote for him.

Richard Hongisto uses  
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Richard Hongisto began his political career as Sheriff in San Francisco in 1972. In 1977, he took over as Police Chief in Cleveland, Ohio, and later moved on to New York, where he became Commissioner of Correctional Services. After returning to San Francisco he was elected as a San Francisco City Supervisor on November 7, 1980.



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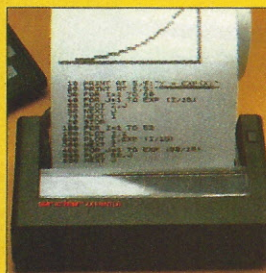
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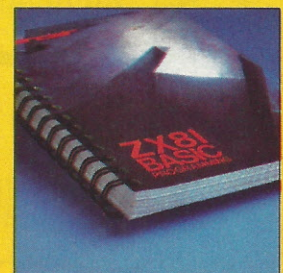
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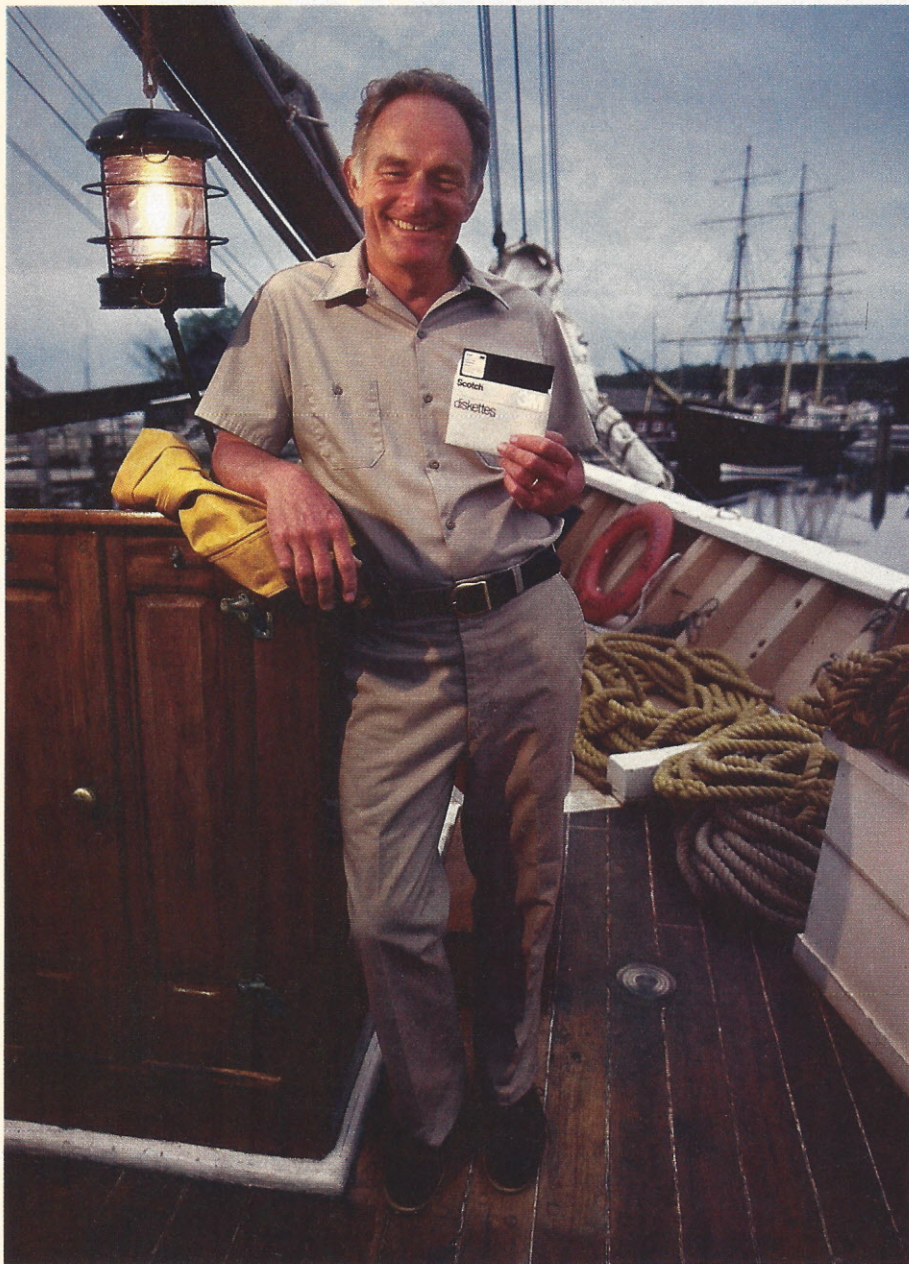
CITY/STATE/ZIP \_\_\_\_\_

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AD CODE	05-PC	PRICE†	QTY.	AMOUNT
	ZX81	\$149.95		
	ZX81 Kit	99.95		
	8K BASIC chip (for ZX80)	39.95		
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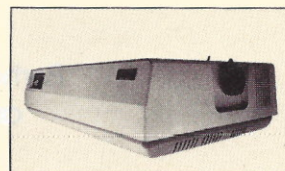
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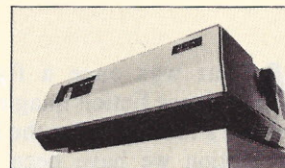
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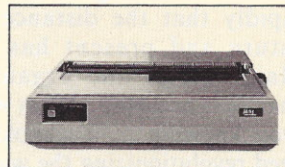
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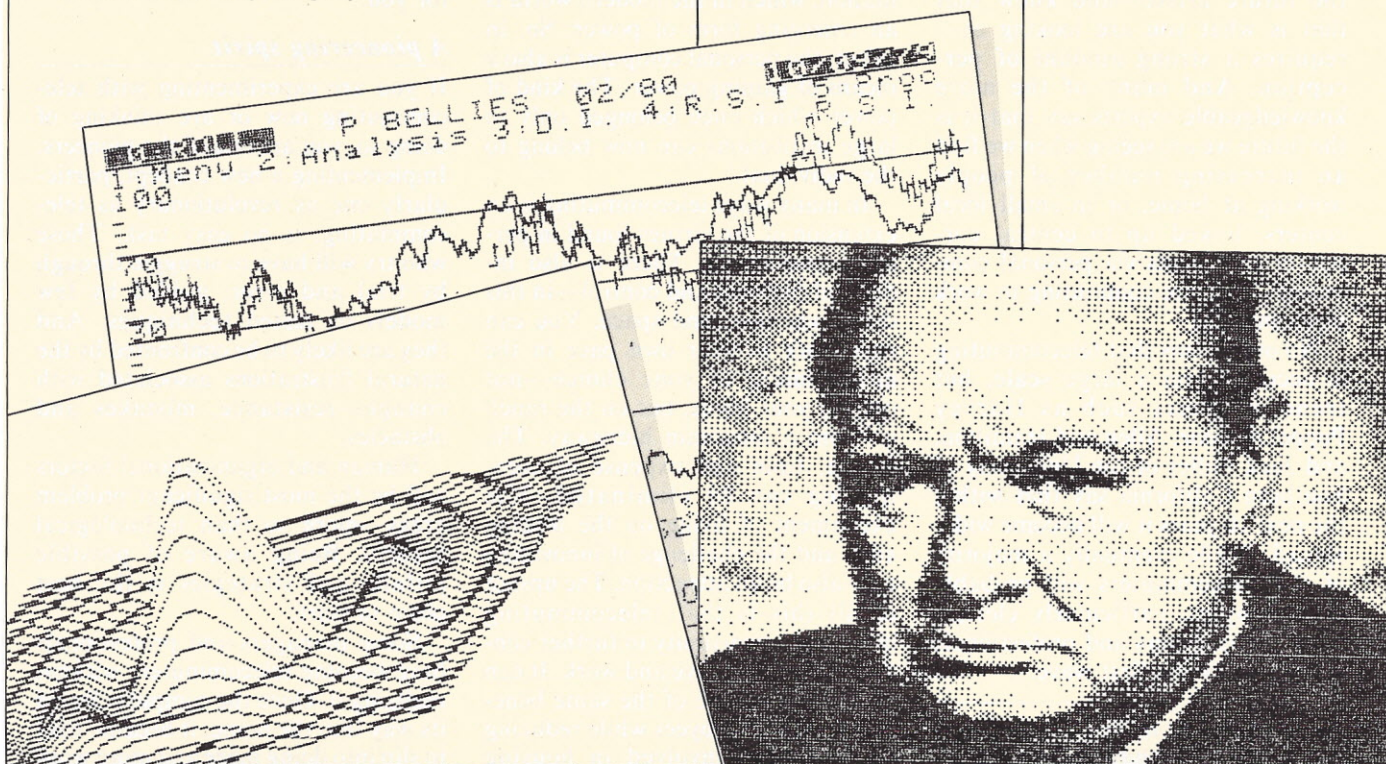
Microline 82A



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## How To Make Telecommuting Work

Perhaps the ultimate use of personal computers lies in the area of telecommuting. But the ultimate will only be achieved if proper planning is implemented

by Dr. Evan Peelle

**W**hat was once a figment of science fiction imagination has become a reality. From the Industrial Revolution we have been propelled into the Technological Revolution so rapidly that the distance between future and present has blurred. Major social and organizational change is occurring almost without us even knowing it. Technology is indeed revolutionizing the way we perform our jobs, relate to each other, and manage our businesses.

To stand on a threshold and watch the future arrive—and know that that is what you are looking at—requires a strong amount of perception. And many of the more knowledgeable experts say that it is the future we are seeing when we find an increasing number of people working at home, or in small local centers, linked up to central corporate data bases via personal computers. They are commuting to work electronically.

No one claims that telecommuting is occurring on a large scale, but trend watchers such as Harvey Poppel of Booz, Allen and Hamilton, and Jack Nilles of the University of Southern California say that within the next 10 years it will become widespread. While eventually a majority of the telecommuters will probably be employees, particularly clerical workers, managers and professionals are currently the first wave.

*Dr. Evan Peelle is an organizational psychologist/management consultant from Ann Arbor, Mich.*

The value that many people see in the personal computer is that it enables them to do what was never possible before—and at a reasonable cost. It offers people increased control and potentially greater achievements in the office, because relief from mundane, mind-cluttering work frees them for higher-level, creative thinking.

### *Information is power*

Perhaps more importantly, the personal computer offers access to information, which in the modern world is an emerging form of power. So, in effect, the personal computer is also a means of gaining power. The kind of power which once belonged only to large institutions can now belong to the individual.

In many ways telecommuting is an extension of the virtues found in personal computing. There is also increased freedom and control—in this case, over time and space. You can now work at your own pace in the environment of your choice—not only in your home, but on the ranch or from a mountain hideaway. The hassle, time and expense of commuting can be eliminated. The excitement of living on the leading edge and the challenge of innovating may also be an attraction. The upshot of all this is that telecommuting offers the opportunity to further control the way you live and work. It can also provide some of the same benefits to your employees while reducing the overhead involved in housing them.

The predicted benefits of telecommuting, which include facility and transportation cost savings, energy and environmental gains, improved job performance, and employee satisfaction, are all reasonable expectations. Still, there are no guarantees that it will work in specific instances. Success or failure will depend on how well one manages himself, his employees and his organization under these changing conditions. The relevant issue, then, is how to make telecommuting work for you.

### *A pioneering spirit*

If you are experimenting with telecommuting now or are thinking of doing so, you are one of the pioneers. Implementing a new concept, particularly one as revolutionary as telecommuting, is no easy task. Those who try will have to struggle through by trial and error, guided by few models or tested techniques. And they are likely to be confronted by the natural frustrations associated with change—resistance, mistakes and obstacles.

Human and organizational factors will be the most significant problem areas—more so than technological factors. Being aware of possible pitfalls and strategies is the best place to start.

Some managers and professionals have become telecommuters without realizing it. Once the computer found its way into the home, it became easy to slip into doing more and more work there. But whether telecommuting is



***"In the modern world, information is an emerging form of power and computers are offering access to this power."***

an unconscious evolution or a conscious decision, understanding your own motivation and some of the common problems encountered can help you reap the maximum benefits.

One manager in the personal-computer industry who works out of his home, located across the country from his central office, has found that telecommuting actually made him a better manager. What was taken for granted or happened by accident in the past now happens on purpose.

Aware of the importance of interpersonal contact with people who work for him, he makes a concerted effort to use his periodic office visits to build good relations with his staff. And he believes that the quality of those relationships is even better than when he was present all of the time. While he first missed being able to "play boss," he found that he preferred delegating work to his computer, and relieving himself and a secretary from routine tasks.

As he became accustomed to interacting with his personal computer, he came to view it as an extension of himself. Much more than a tool, it has become his assistant and a means of communicating with others. He doesn't feel isolated. This manager discovered that he had to focus on being disciplined and organized. By scheduling and blocking out personal time, he avoids problems of non-productivity and its opposite, burnout. Based on this experience, he offers some tips:

- Non-productivity—Don't kid yourself about staying home to work. Set objectives, and plan, organize, and schedule your time. Discipline yourself.
- Burnout—Separate your personal and work lives even though they are taking place in the same environment. Plan time to relax and maintain social or family relationships.
- Gimmickry—Don't lose sight of the fact that the computer is a means to an end, not an end in itself. Focus on results.

- The "boss" syndrome—If you feel a loss in not having someone to be "boss" to, delegate work to your computer.
- Losing touch with employees—Concentrate on effective communication, making the most of your brief contacts. The key is quality, not quantity.
- Isolation—Learn to appreciate the interactive qualities of your computer.

#### ***It's not for everyone***

It takes a certain kind of person to do well in the conditions inherent in telecommuting. Not everyone is a candidate. Some people are really not interested. Others may be interested, but not capable of performing. They may like the idea of staying home, reducing commuting time and costs, or getting away from the boss or office. But the wrong person can experience failure and frustration. A good "fit" between the person and the job is critical. The same factors related to selecting the right employees for telecommuting also apply to decisions about your own involvement.

Voluntary self-selection will eliminate some of the non-volunteers who would not do well. If people are not highly motivated to be involved in telecommuting, they should not work in those conditions. Adequate screening can weed out the others. Specific personality and skill requirements should be used as criteria to select the people who have the potential to be successful. Training and development can increase the pool of capable people. Some of the most important characteristics needed in telecommuting are:

- Achievement motivation—self-satisfaction with accomplishments, a goal orientation, task focus, and high-quality standards;
- Persistence and discipline—the capacity to concentrate, avoid distractions, and keep going in the face of difficulties;

- Planning—the ability to organize, prioritize and manage time;
- Self direction and independence—high needs for socializing, structure, acceptance and recognition can cause problems because those needs won't be met.

Various methods can be used to select the right people. An orientation session in which the hard facts about telecommuting are presented will encourage those not suited to self-select out. Observation of performance can reveal clues. Personality tests which measure the relevant factors may be useful. Looking at successful independent workers such as field salespeople or free-lance writers may provide ideas about qualifications. The ultimate screening method would be a trial period in which the person could be tested on-the-job.

#### ***Suitability of the work***

All work does not lend itself to telecommuting. Some tasks can be accomplished independently, with little need for interaction between people. Others require face-to-face contact. Some jobs require on-site work because materials are manipulated, equipment is needed, or a particular environment is necessary. Determining whether a job is appropriate for telecommuting is not always easy. Most jobs are not clearly either/or and may be suitable only part of the time. While the determination may seem simple at first glance, it is easy to underestimate needs for interaction and overestimate needs for on-site activity.

Analysis of each job can be done to determine whether telecommuting is possible, and if so, when and to what degree. Accurate analysis can be made through observation of the jobs in process and by talking to the people who do the work. Keeping a log of all activities performed on a job, including informal interactions with others may be useful. Because most work that is appropriate for



## ESSAY

telecommuting will require some interaction, it is important to understand what those needs are and to design the job accordingly. Jobs that are most suitable for telecommuting are those that involve:

- Routine tasks;
- Alone "think time";
- Office, sales, technical, research, managerial and professional work.

### *Managing telecommuters*

The attitude and skills of managers can greatly affect a telecommuting effort. They are the ones who are accountable for the operation of the practice. Managers tend to have a number of concerns about telecommuting, and many of them are understandable. Some managers resist this approach on the grounds that employees won't be interested, or won't be capable of getting their work done without close supervision. The reality is that some people won't be interested or able to handle it.

It is true that supervising from a distance is much more difficult than close control. Even deeper runs the fear that a manager can't remain a manager without people around to manage. Anything new and unfamiliar seems to contain demands which will make the job even harder. The role may actually demand that managers refine their skills or develop new ones. They may also need to change their leadership style and establish a new repertoire of behaviors.

### *Designing the organization*

Managers will be needed more than ever to provide leadership. Though telecommuters will be operating autonomously in locations distant from management, they will still need direction and help. Realistically, employees will be spending most of their time completing work assignments independently, but they won't be able to do it in a vacuum.

All organizations—large corporations, small companies, and

basement operations—are social systems made up of individual human beings. They require a "social glue" to bond those individuals together into a whole unit working for the good of the system. No organization can achieve its goals without commitment of the human spirit. Feeling like an important member of a team, working hard for a respected boss, gaining recognition for good work, and sharing the load with co-workers are all ingredients of motivation.

Ultimately, the success of the organization is a function of how well human intelligence and creativity are directed toward a common purpose. Shared perceptions and expectations focus that energy. Communication is needed for planning and solving problems. Yet telecommuting limits the interaction that establishes motivation and common purpose. Even though telecommuting is an isolated activity, each employee's motivation, loyalty to the organization, and commitment to a common purpose are critical for organizational success. These factors influence performance and, in turn, reflect on productivity and quality outcomes.

Human interaction must be designed into an organization involved in telecommuting. As social beings, we readily form attachments and loyalties to groups. We do our most creative thinking synergistically with others. Deals, compromises, learning and problem-solving go on when people get together. Information exchanges that help the work go smoothly and lead to improvements take place. The center or "cottage" structure readily lends itself to interaction, so on that basis it may be preferable to isolated, at-home workstations.

Interaction can be formal and regularly scheduled, or informal. Groups can be temporary, set up to deal with a particular issue, or they can be permanent, established to engage in ongoing planning and problem solving. People who do related work or share

common areas of concern can be brought together. Various levels or segments of the organization can be represented. Whatever is needed and whatever works is the rule of thumb. Various strategies include:

- Social activities that build bonds—picnics, luncheons or dinners, office parties, sports teams and civic-oriented groups;
- Information sessions—small groups and larger segments of the organization in which information about progress, future directions, the "big picture" and concerns is shared;
- Self-managed work teams—having some responsibility and authority for planning and controlling the work as well as doing it, such as distributing work, and monitoring the errors;
- Problem-solving groups—to recommend solutions to problems, cost or time-saving measures, improvements or innovations, and reducing errors.

### *Strategies for success*

While telecommuting is a new concept without established guidelines, there are well-proven techniques for bringing about change. Chances of success will be greater if you:

- Plan carefully—consider possible benefits and risks, anticipate problems, work out a long-term strategy in detail, and involve those who will be affected;
- Evaluate progress—get feedback from those involved, and solve problems along the way;
- Start on a small-scale, trial basis—only part time, one computer, and a few people;
- Take care of human needs—examine reasons for resistance, meet social and motivational needs as well as needs for support;
- Arrange for those things necessary for carrying out the change—information, training and resources;
- Link up with others who have experience—people involved in telecommuting or consultants.





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## Would Working At Home Be Wise?

There are risks and rewards associated with all relocations.  
Moving into your home address is no exception

by Margo Downing-Faircloth

**M**et Stephen James, retired from the office but not from work. Right now, it's 2 p.m. Stephen pushes himself away from his personal computer, where he has been working on a routine project for his company, a major data-processing firm. He walks into the kitchen and goes to the refrigerator for a cold drink.

Just eight years ago, Stephen was a highly visible professional on the move, one of those businessmen who thrived on life in the fast lane. He never planned to retreat to his plush suburban condominium, where his three-piece suits are beyond irrelevance. But with soaring energy and utility costs and a failing system of public transportation, his company chose to reduce its overhead and operating costs by closing down its center city office and installing personal computers in the homes of its employees.

This phenomenon is not unique to Stephen and his financially burdened firm.

Outside, in the modern metropolis, the once bustling streets are quiet. The half-empty downtown office buildings are an embarrassment and a sad reminder of the days when they were the busy focal points of corporate activity.

This is a pretty grim depiction of a future in which the average American professional employee works ex-

clusively from home. But it is a view held by many corporate managers who are frightened and confused by the popular concept of the "electronic cottage." In fact, it's one of the reasons that the era of working at home electronically, predicted by author Alvin Toffler in *The Third Wave* and a topic of fiction writers and other futurists as well, remains for the most part just that: a topic.

Although telecommuting—the name given to working at home on a personal computer and transmitting information electronically to a central office—has been possible for several years, it is still something that is being done only by the most progressive corporations, those willing to wrestle with new concepts.

### Reasons for resistance

Charles McClintock, a Cornell University psychologist who is conducting research on people who telecommute, offers some hint about why many corporate managers are resisting this work style. "It violates a lot of traditional norms," he explains. "Many people who supervise others often base the quality of their employees' work on how they show up at the office—on time, dressed properly—and on how they deal with others. So how do you supervise people and manage an organization if nobody's there?"

McClintock adds that in his research, which has been under way for about a year, he found that employees at home have also had to make substantial adjustments to cope

with the changed work environment. Some go so far as to simulate the office experience.

"A colleague of mine actually puts on a suit, dresses up, even though he isn't going into work," he says. "He even tape-recorded sounds from his office. It's not as funny as it seems. People often rely on mundane cues to remind them that they are supposed to be in certain roles. Also, very often people don't trust themselves. There is the temptation of television, the refrigerator, whatever."

Despite the obstacles, the rapidly widening telecommunications capabilities of personal computers and those corporations willing to innovate to combat employees' inefficiency are teaming up to make telecommuting a growing phenomenon.

Jack M. Nilles, director of interdisciplinary programs at the University of Southern California and the author of three books on personal computing, including one on telecommuting, is one of those who believe that this view of work will become more widely accepted. He estimates that by 1990, 15 to 20 percent of American workers will be working from their homes.

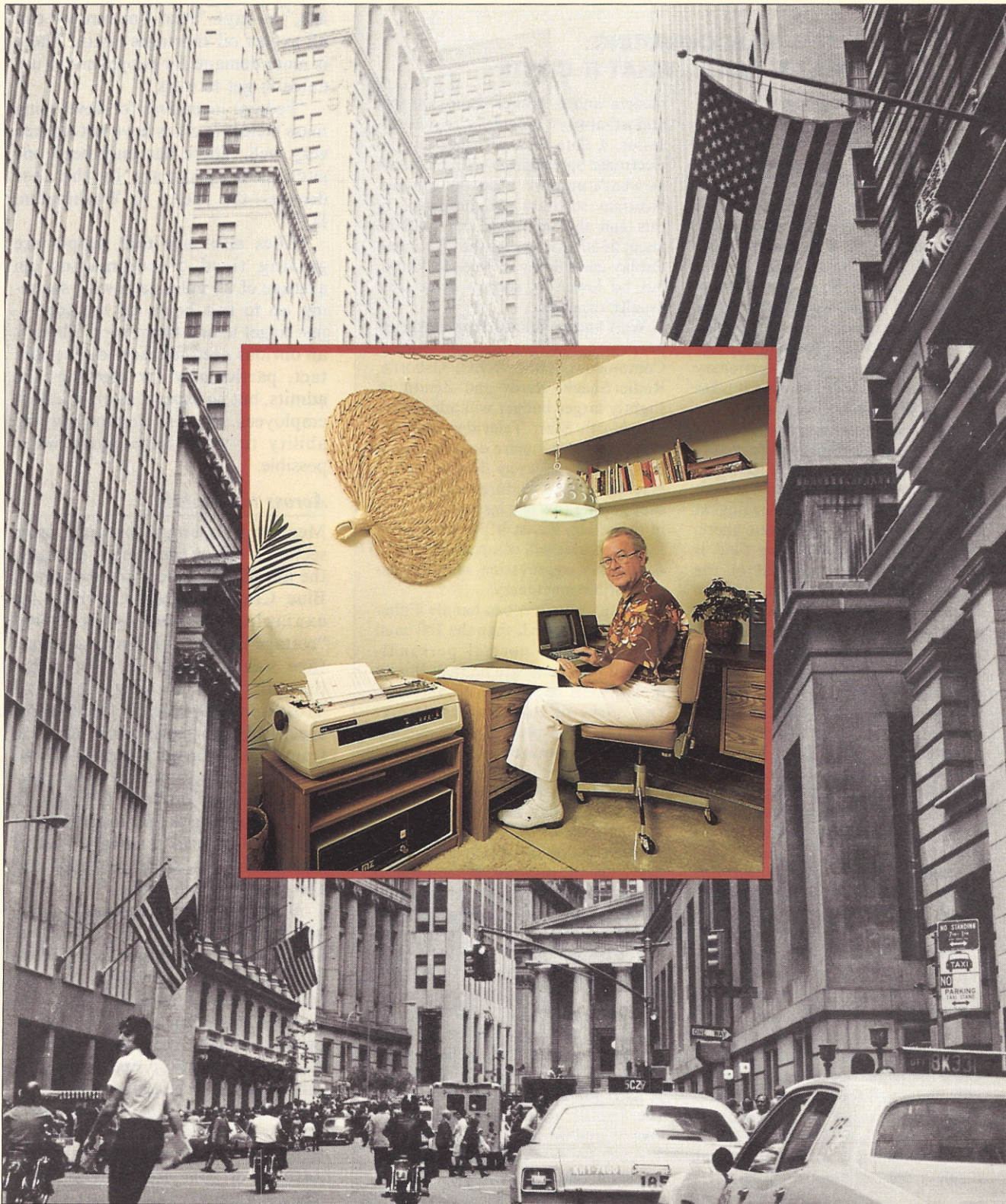
He bases his predictions on the rapid development of unique social conditions. "Personnel costs are increasing generally at a rate higher than inflation for information workers, programmers, and special-

**Jack B. Carne manages extensive stock-market and real-estate holdings on his computer from his Hawaii home.**

Margo Downing-Faircloth is the editor of *Dowline*, a publication of the *Dow Jones News/Retrieval Service*.



*"The success of telecommuting depends on the productivity of the individual when working in an unsupervised environment."*



photos by Augie Salbosa; H. Armstrong Roberts, Inc.



### **TELECOMMUTING: WHAT IT TAKES, WHAT IT COSTS**

**P**eople who work at home often say that keeping home and work life separate often ranks at the top of the troubles list. So if you are planning to set up a powerful personal-computer system in your home office, consider this: You may not be able to keep your family out of there. They won't be able to resist the desire to make friends with your system. So as the first purchase, you might want to consider buying an inexpensive family unit, like the Atari 400, VIC 20 or Radio Shack Color Computer—as a diversionary tactic. The \$600 could be what it takes to make the home office viable.

On to telecommuting proper. As a pioneer in a pioneering venture, you're in the unenviable position of having to put together the right system while not having the advantage of looking at what everybody is using out there. Because the telecommuting field is just beginning to step out of the shadows—and because it is not the normal way of doing business—there are no real system standards available. One thing that is certain, though, is that you can't build your system on a shoestring budget. To be successful, plan on spending some money because you need good, fast communications between your home office and your company office. This requires a computer on both ends, naturally; modems and telecommunications software; and agreed upon protocols for transferring the information.

Modem software requires operating system compatibility for most purposes. So if the office machine uses Apple DOS or CP/M, the home system will go in easiest if it matches. Alternatively, both systems could communicate via remote data bases like The Source or Tymnet's electronic-mail service, but even there it's easiest for the systems to be the same. Then the home worker can take diskettes back and forth between the two offices, which is just about mandatory.

The proper home-office system will include a computer with an 80-column display, one or more disk drives, a

modem and a printer. Software will almost always include a word processor, a data-base manager and an electronic spreadsheet—all the same as what's at work. Add the communications software and hardware to this and the minimum cost will be about \$3500. Giving up the 80-column display could bring it down to \$3100, but no lower. A second drive isn't usually required.

Well known brands that make appropriate systems include Apple, Commodore, IBM, NEC, Osborne, Radio Shack, Xerox and Zenith. A slightly larger budget will add makes like North Star, Televideo and Toshiba, and a few more dollars adds at least 50 others. Users dazzled by the machine's latest features will agonize over getting this one instead of what's in the office. Resist it! No amount of fancy features will compensate for the day-to-day aggravation of using incompatible machinery.

Many computers can handle higher transmission speeds than the 300 baud rate to which normal personal-computer modems are limited. If a lot of data must be transmitted, there are two ways of making that time-effective: high-speed modems and unattended transmission and reception.

Shoestringers will insist they can do without a printer at home, or even that they can just buy a terminal and connect it to the office multiuser system. That could cost as little as \$700 or so, but it has drawbacks. It requires an office multiuser system or a mainframe to which a terminal can be connected.

The bottom line? Expect to spend at least \$3000, or probably \$4000, and easily up to \$8000 or more for a system with bells and whistles. Checking with one's tax consultant could make this cheaper than the purchase prices would indicate, though. If the system is used for business only (remember the family computer we started with?), and the users is in a higher tax bracket, the net out-of-pocket expense could be startlingly cheap.

ists," he says. "And I'm sure we can all expect oil shortages again. There is more demand for people not to use autos to get to work.

"Federal incentives for developing mass transit in cities have not worked very well. There has only been one successful program in the last decade—the Metro in Washington, D.C."

Nilles also says that people are getting tired of commuting an average of 20 miles each way, spending up to two hours on the road—just to get to and from work. There is an obvious need for face-to-face contact, particularly for meetings, he admits, but he expects more qualified employees to start demanding the ability to work from home when possible.

#### ***Across the country***

Meanwhile, a broad corporate cross section is taking the plunge, although the absolute numbers are still small. Blue Cross of South Carolina, for example, has employees called "cottage keyers," who work at home. (See sidebar, page 46.) The Continental Illinois National Bank and Trust Company recently hired people specifically to work from home to transcribe recorded information and transmit it electronically to computers at the base office in Chicago. In both of these cases the number of employees involved is small—under 10—but results, so far, indicate that the programs will grow.

A much larger telecommuting plan has been adopted, though, by Control Data Corp. of Minneapolis. The firm started out with a training program for physically handicapped employees to learn software development so that they could work at home, and ended up expanding it to include the non-handicapped.

Now, Control Data has approximately 80 of its 48,000 employees telecommuting, primarily systems analysts or computer programmers. They work either full- or part-time in



**"I've started to wonder what they're going to do with all those tall buildings when nobody's there."**

a special program called Alternate Work Sites.

### ***Offering an alternative***

"For the past few years, we've been energy-conscious," says Pat McKennie, who helps administer the program. "We looked at all of the alternative work programs and decided this might be an excellent way to do it. Many of our employees were traveling or working at customer sites, so they really didn't need to go into the office anyway, except for meetings." Control Data employees join the program on a voluntary basis. If they find that it is not suitable, they don't have to remain in it.

McKennie says the company found "great interest" among many of its employees.

"We are involved in recruiting highly professional and highly skilled people," she states. "Telecommuting is beneficial to us because it means that we can offer a range of environmental alternatives. It also helps when people have to be transferred or relocated. They can work from home or from a satellite work site."

The end result, McKennie says, is a savings on facilities expansion, fuel costs and capital investment. What's more, she says, employees feel they are more productive, because there are fewer interruptions during the days when they work at home.

### ***Giving it away***

Apple Computer in Cupertino, Calif., has a special program for its employees that allows them to take a computer home and it becomes their property after a year. While employees are not required to do company work with these computers, Apple is encouraging getting people to use them on line with the home office, according to Rock Cary, information network manager at Apple. Cary says it is hoped that in situations where employees cannot make it to the office, they will in the future at least still accomplish some work

and be available for questions.

"Potential applications of telecommuting are probably as far as your imagination will take you," Cary says. But he cautions, "There is always going to be some type of resistance or hesitation. It often depends on the productivity level of the individual in working in an unsupervised environment."

For remote work from home to really take hold in this country, Cary adds, there must be a general proliferation of personal-computing equipment in American households and a better understanding of what can be accomplished. "The vehicle is coming into place. Now we have to figure out how to drive that vehicle," he says.

Cary has been working from home using an Apple. "I usually check for incoming mail addressed to me. Next, I answer queries or problems. Then, using a word processor, I am able to formulate notes, memos or documents." He adds that he fre-

quently uses the telecommuting network when he gets up at about 6 a.m. to take care of questions employees may have back east, where it is already 9 o'clock.

### ***Independent workers***

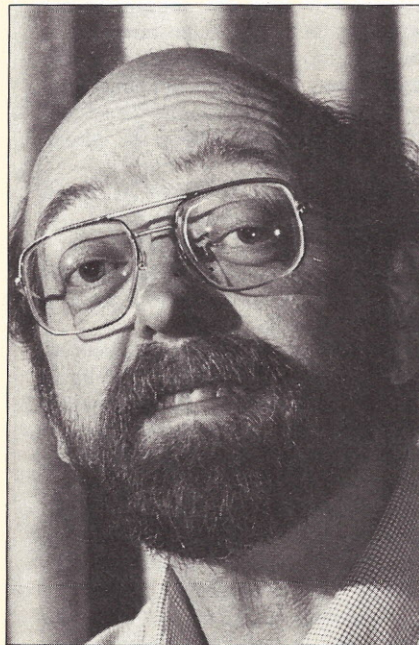
Initially, at least, it is becoming apparent that those employees who adapt more readily to telecommuting are those already accustomed to working alone, such as writers, programmers, and typists or word-processing personnel.

Rita Mae Kelly, for example, a professor in the Department of Urban Studies and Community Development at Rutgers University in New Brunswick, N.J., uses her Apple II Plus to review manuscripts and to shuttle messages to another Apple in Princeton, N.J., one owned by a colleague who is working with her on a series of books on women in politics. "I like the system because I can work on it when I want to," she says. "It allows me to comment on manuscripts and send messages. I can also do research from home when I tie into an educational network at Princeton University."

The ability to use telecommunications is invaluable for education and research, Kelly continues, predicting that the personal computer in the home will change the way professionals work and keep abreast of information and literature. "If you need information, it's much quicker to get it off a data base like The Source," she says. "You pay college students \$5 an hour to do research for you and you can't be sure how comprehensive it is. This way, you can do it yourself and perhaps more thoroughly."

### ***Portable computers***

As interest in telecommuting develops, computer portability becomes an increasingly sought-after feature—sought after because people who are still mostly working in an office can stagger their hours and do



**Jack M. Nilles director of interdisciplinary programs at the University of Southern California, estimates that by 1990, 15 to 20 percent of American workers will work from their homes.**



*“People often rely on  
mundane cues to remind them  
that they are supposed to be  
in certain roles.”*

### FOR THE “COTTAGE KEYERS,” THERE’S NO PLACE LIKE HOME

**M**ost of the current telecommuting pioneers are still operating in a sort of corporate limbo—usually there are either no job-related policies for what they are doing, or their work is being done purely on a trial basis.

But that’s not quite the case at Blue Cross and Blue Shield in Columbia, S.C. There, a handful of women, dubbed “cottage keyers,” churn out a phenomenal 70 percent of the Blue Shield claims reports on personal computers in their homes.

One reason for this program’s success, says Jennifer Thomas, manager of the Blue Shield claims department, is that careful work ground rules were set up and agreed upon by the employees and the company before the firm instituted telecommuting.

The ground rules, for example, require that a cottage keyer complete 1200 medical-claim forms a week; the rules also establish a piecemeal payment for the workers. Thomas says that as a hedge against inaccuracy, all errors are deducted (according to set rates) from the cottage keyers’ weekly salaries.

The Blue Shield telecommuters use the Texas Instruments 700 Series personal computers to input the necessary information. They then transmit the completed claims forms via cassette tape to the company’s IBM 3033 central computer.

The cottage-keyers program began five years ago on a trial basis with one employee. Today there are three telecommuters, and one recently retired.

Thomas says that before the cottage program began, the company needed many more operators to equal the amount of work done by the telecommuters. A small number of telecommuters has clearly taken up a large slack, she adds. “And obviously the cottage keyers don’t get certain fringe benefits like regular employees,” says Thomas, “so the company saves money.”

Cottage employees appear to be satisfied with the arrangement, she adds, because they don’t need childcare services and can do their work practically any time.

And, says Thomas, “There aren’t any worries like ‘Do I have a pair of stockings to wear to the office this morning.’”

Thomas points out that the same women who started with the program are still with it, and they are, in many respects, as dedicated and attentive to the firm’s needs as those employees who work at the office.

“If one is sick, for instance, another will pick up the slack for that one,” she says.

Though many managers are shunning telecommuting, primarily because it reduces personal interaction between employees and supervisors, Thomas feels that the limited contact has improved her ability to manage her workers. Instead of being concerned with how she appears to her subordinates, with telecommuting—because most of her contact with the employees is on the telephone—she only has to be sure to send direct and consistent orders across the phone lines.

“I don’t have to think as much about my appearance and my demeanor in front of my subordinates,” she says. “All those working at home need to know is that I am treating them all equally.”

Because of the measurable success of the cottage keyers in the basic claims department, Blue Shield’s major-medical insurance office is planning to set up a telecommuting program as well.

Corporate officials in other firms say they are watching telecommuting experiments like the one at Blue Cross closely before deciding to jump on the bandwagon. But up and down the corporate grapevine it is becoming more commonly said that the many advantages of this new work-style are rapidly surpassing any of the disadvantages.

part of their work at home if they can take their computers with them. And although this is not telecommuting in its purest sense, most experts feel it is a part of the future telecommuting landscape.

There were many in the personal-computing industry who were highly skeptical of Adam Osborne’s portable computer when it was first announced last year. But today, many of its critics have been quieted.

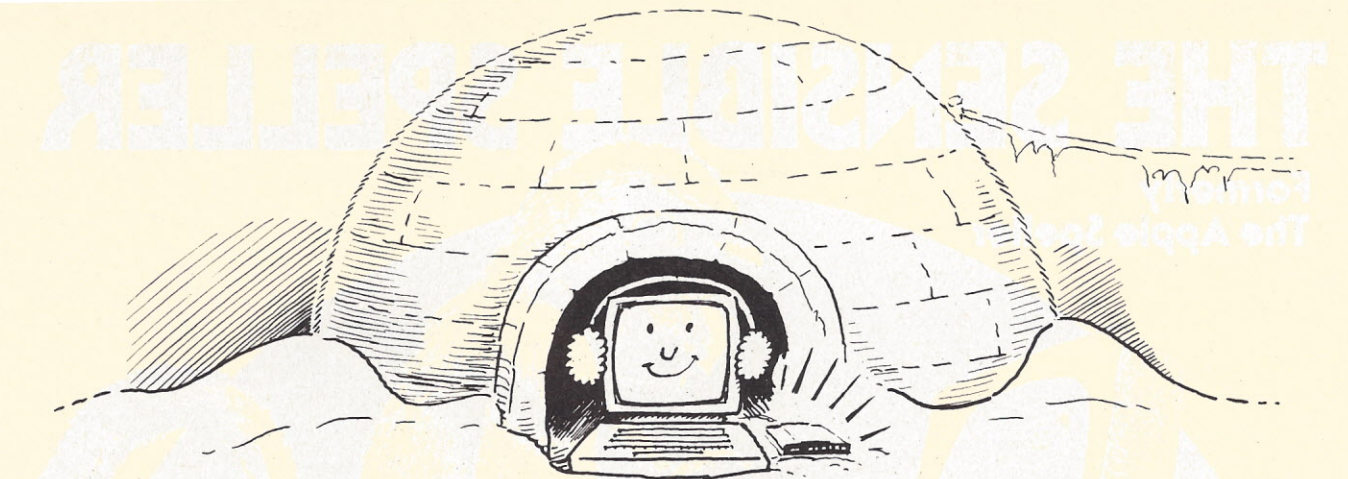
The Osborne was the first personal computer to be truly portable. According to Adam Osborne, the company president, the 24-pound machine, which has a built-in screen and two disk drives, has been shipped to about 10,000 customers. In fact, Osborne is so optimistic about this area of personal computing that he expects to sell that amount each month once production is expanded. To do that, the Hayward, Calif., company has now established a plant in Dayton, N.J.

Telecommuting will probably finally arrive as a work style simply because its virtues will spread along the corporate grapevine as more people try it. At present, many of its adherents prefer to avoid the debate while enjoying their days working at home.

Kent Walker, for example, who works for Information Systems Design, a subsidiary of Control Data in San Francisco, says, “It allows me to get a lot more done and saves me a two-hour commute each day. I truthfully believe that a good percentage of our population will be working at home in the next 10 years. In fact, I’ve started wondering what they’re going to do with all those tall buildings when nobody’s there. I get more work done not having to dress up. I don’t even have to shave or look presentable, and I can even have a few beers while I work.”

Kent Walker is real, not imagined like Stephen James . . . or did Walker say he changed his name to James last year?





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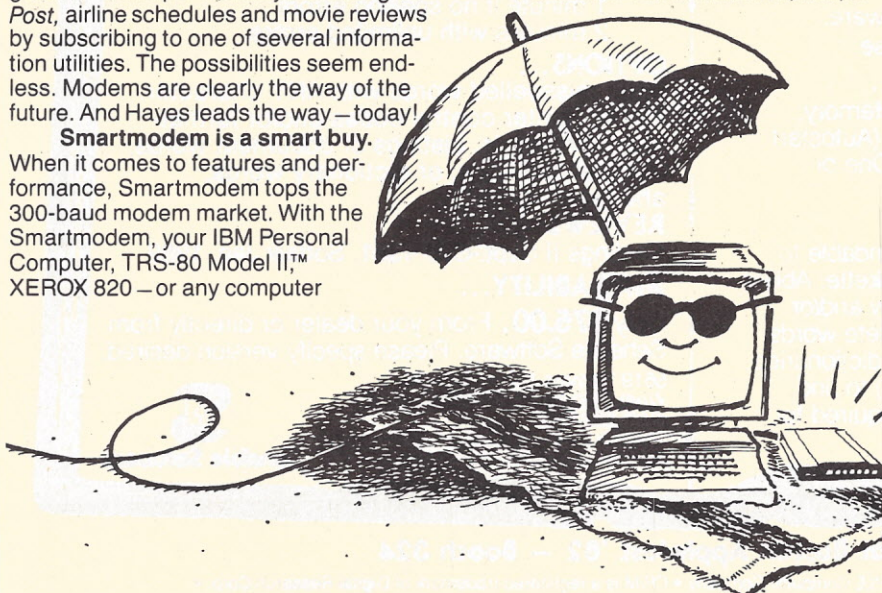
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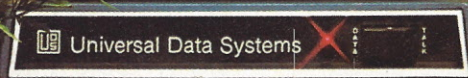
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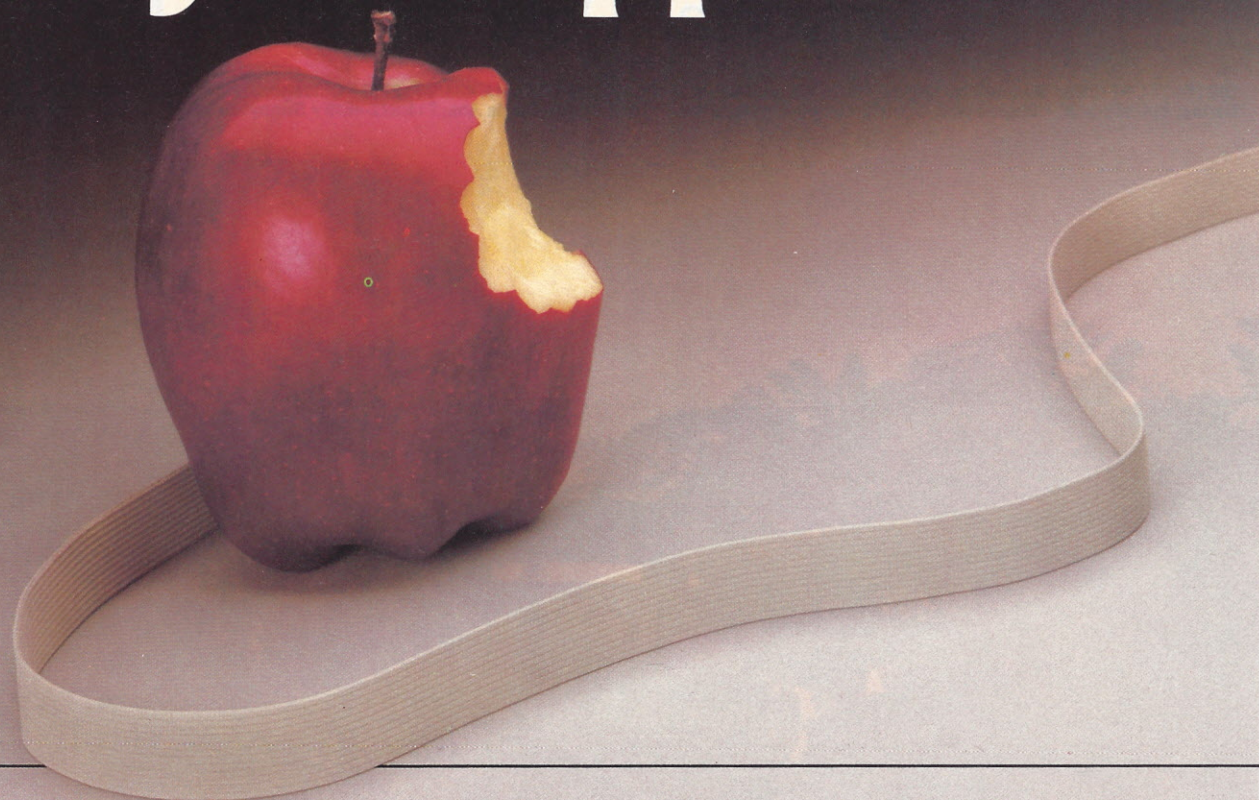
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## High-End Systems: The Price Of Power

When looking for a high-end personal computer, users should be careful not to purchase on the basis of brand name alone

by Lee The'

*Editor's note: Our research into the question of upgrading a computer system pointed up one very important fact: There are so many products on the market that only an all-inclusive chart would give you all the information you need. For full detail on what's available, please turn to page 103.*

**T**here may come a time when your trusty personal computer just doesn't have the horsepower to handle your tasks. If that happens, you'll need an immediate solution to the problem. And the penalty for not finding the right solution could range from added frustration for yourself and others to actual monetary loss because the computer just couldn't do the job.

But before you can hope to remedy the problem, you must first understand your own needs. There may be several different sets of hardware and software that can meet those needs. If you're looking for a larger personal computer, stay away from systems that are beyond your needs; you could get talked into buying an institutional computer.

### ***Moving on up***

John Coyne needed a larger system. He used an Apple II for two years in Ireland. Then he moved to Denver,

*A man who monitors the personal-computing industry even while sleeping, Lee The' is Field Editor of Personal Computing.*

where, as an independent contractor, he works for Noranda, a Canadian mining firm. Coyne, a geophysicist, seeks out valuable metals like zinc, molybdenum, copper, lead, gold and silver. He now uses an Apple III to do complex mathematical modeling based on data gathered in the field, where he takes electromagnetic and gravity readings at a given site. The voluminous data from these readings are turned into a picture of the Earth's interior at the site, and Coyne analyzes it for the presence of ore-bearing veins.

Coyne performs matrix inversions and finite element analysis on his Apple III; he also uses it to solve integral equations to create graphic data. This kind of number crunching isn't complex enough to warrant using a mainframe. With his own high-end computer, Coyne can do many runs without worrying about turnaround or the cost of computer time. But the sheer volume of numbers he works with was enough to force him to put aside his Apple II for anything more than data reduction.

Coyne's modeling technique (he writes his own scientific software) involves the creation of a simple model, which he then recomputes until it most closely fits the data.

Coyne spent a lot of time shopping before deciding on the Apple II, but he purchased the Apple III relatively quickly. For one thing, the programming languages, like Business BASIC, were similar. For another,

he was pleased with the great support he'd received from Business Computer Systems, his dealer in Lakewood, Colo. He also liked the "tremendous amount of available software that the Apple III can run in its Apple II emulation mode."

Coyne says he still uses his Apple II for field work, because the III isn't very portable. He also uses his Apple II as a data-reduction device. Entering map data into a computer through the keyboard is pretty slow business, Coyne reports, so he does it off line with the Apple II and a Summagraphics (Fairfield, Conn.) digitizer. This same operation would tie up a larger computer for three to seven hours.

Coyne's Apple III system cost about \$12,000. It includes an extra disk drive, Apple's Profile Winchester disk drive, a Houston Instruments DMP-7 six-pen plotter, Epson MX100 printer, Novation AppleCat modem, and an Apple III Monitor (for the anti-glare screen). He also has an extended warranty, which Coyne feels is a necessity in a business environment, and a case for lugging the computer around.

### ***You can take it home, too?***

Coyne throws his Apple III in the back of his pickup truck and takes it home, along with the disk drives. Coyne and his wife do all the mailing lists for a historical society they belong to on the Apple. They also do the household books on it. Coyne does



*“Stay away from systems that are beyond your needs; you could get talked into buying an institutional computer.”*

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**2**

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**8**

- 1 YX-3200 BUSINESS COMPUTER**  
*Sharp Electronics*
- 2 VICTOR 9000**  
*Victor Business Products*
- 3 Z-90**  
*Zenith Data Systems*
- 4 BUSINESS SYSTEM 200**  
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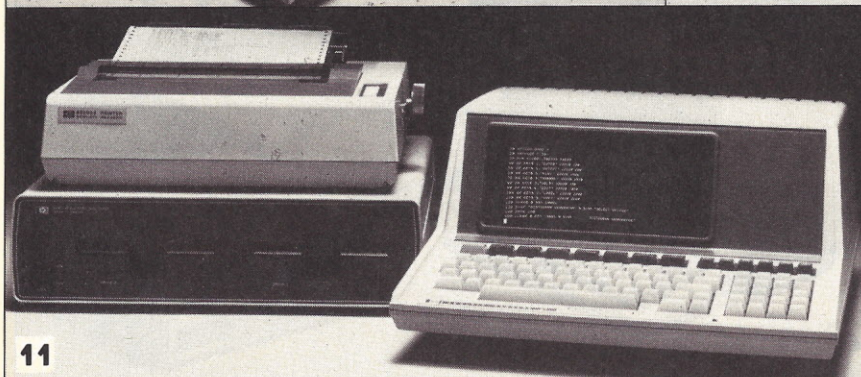
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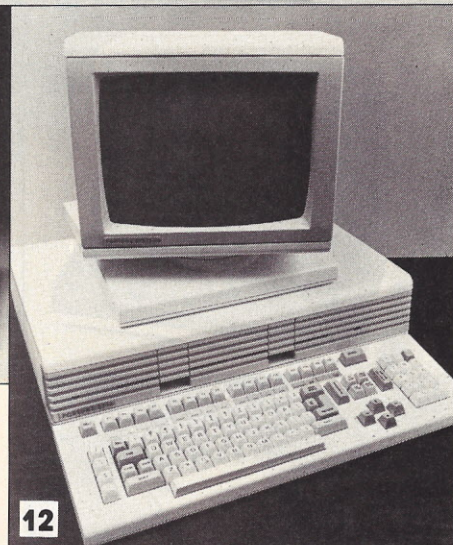
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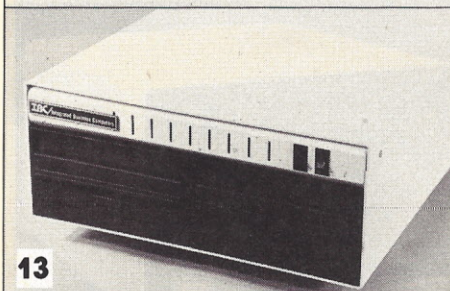
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- 9** INFORMATION STATION 1000  
*Savin Information Systems*
- 10** TS-802H  
*TeleVideo Systems*
- 11** HP-87  
*Hewlett-Packard Co.*
- 12** FORTUNE 32:16  
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- 13** CADET  
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- 14** SUPERPET  
*Commodore Business Machines*
- 15** ARCHIVES III  
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15



***"High-end buyers must look for the application software that's needed, and only program those functions that can't be bought."***

word processing at home and work with Word Juggler (by Tim Gill of Quark Engineering, Denver). He likes that word processor because it has a template that overlays the keyboard to show all the commands. Coyne thinks it matches a dedicated word processor, and he has Pascal for transportable programming.

Coyne suggests that other high-end buyers look for the applications software that's needed, and only program those functions that can't be bought. He notes that those who use their computer as a business tool will find their hardware choices dictated by software availability. In general, he recommends the new software Apple is releasing for the III.

#### ***There are other ways***

A less science-oriented but no less enthusiastic user is Jack B. Carne. A retired Rand Corp. military-communications analyst, he started programming at the age of 62. He has two identical Vector Graphic (Thousand Oaks, Calif.) System 3 computers, which cost \$9,000 each and are equipped with NEC (Elk Grove Village, Ill.) Spinwriter printers. Because the Vectors aren't very portable, he uses one computer at his home in Asheville, N.C., and another at his Honolulu residence. Carne says the computers have been so valuable to him in his real estate and stock market investments—and especially in tax work—that "they're worth \$25,000 apiece."

Unlike many high-end users who stick to store-bought software, Carne enjoys programming. "Unless someone has reason to think there's something wrong with the way he thinks, he can program. It takes a little time. At first you fumble around a lot, finding the conventions. My programs are evolutionary. My first stock program was crude, but it's gone through more than 30 iterations [revisions]. Any reasonably intelligent person who can devote, say, six hours a week for three months will

have several very useful programs up and running. In two years he'll have several dozen."

Carne thinks he actually saves time creating his own programs, because it takes so long to plow through the methods and documentation of the canned variety. "If I were a businessman doing very defined tasks, I might buy a package. But I'm in a fluid situation."

#### ***Shopping for computers***

Carne started programming on a Texas Instruments TI 59 calculator, which allowed him to do investment work in a third the time it took with pencil and paper. Soon after, with encouragement from some programmers he knew, he began to shop for a computer. Two years ago, he went to Bob Moore, owner of Honolulu's Computerland, who demonstrated several models for him, in detail. "I went to Computerland because there was also one in Asheville. It's worked out fine so far. In two years I've had two spots of trouble on the Spinwriter and one on the computer. That's it."

Carne uses his system to track 100 stocks every day with a program he wrote himself. He feeds in the prices, and the system summarizes gains and losses within any time span. It takes four to five minutes to get this information.

And, Carne boasts, "I sold a big piece of real estate and would have incurred a big capital-gains tax. But using the computer, I was able to save about \$20,000 worth of taxes. I first calculated the tax program with all income and expenses and figured liability. Then I cranked it through changing parameters to other forms of property and income. That showed me how to invest to avoid the tax bite."

He's not suggesting that high-end personal users should program everything, though. He uses Vector Graphics' Memorite III word processor, for instance, and says he

wouldn't know how to start developing a word-processing program. But in his programming he does "what-ifs," playing with data by changing parameters.

"It's one of the most interesting things I've ever done," he says. "I can see myself still working on some program when I'm 98 years old. A man and his computer develop a symbiotic relationship. The computer and I think together; it talks to me and I talk to it. Together we turn out some interesting stuff."

#### ***The challenge: selecting one***

There are at least 70 nationally distributed makes of high-end personal systems on the market. Some of the most popular are from Altos, Apple, Burroughs, Commodore, Cromemco, Data General, DEC, Dynabyte, Hewlett-Packard, IBM, Monroe, North Star, Onyx, OSI, Tandy (Radio Shack), TeleVideo, Vector Graphic, Victor Business Systems, Zenith and 50 or so more. Which companies will be around in five years? And how do you choose one from among so many?

Computerland's Moore has this advice for new high-end buyers: "The hardware is really a very small part of the decision. Unfortunately, most people are too conscious about brand-name computers when they should be thinking about the solution to their problem. The business owner should investigate software that most closely relates to his business and is easy to use and easy to learn. Then he should buy a machine that runs that software and that he feels comfortable with."

Moore points out two pitfalls waiting for people who talk to their dealers. Buying exactly what a salesman recommends may not guarantee satisfaction. But the buyer who carefully specifies the systems that are already in place in his business may become frustrated because the available software isn't an exact duplicate of the company's manual system.



## *“Those who use their computers as business tools will find their hardware choices dictated by software availability.”*

Custom software that replicates a specific manual method can be prohibitively expensive; it can also tie the user to a particular programmer.

For example, a furniture chain in Mountain View, Calif., hired a college student as a free-lance programmer for its accounting package. But after completing this task, the student decided he hated programming and he's now working with his hands in Oregon. The system works very well now, but the company could lose in the long run because no one else there understands the system well enough to update it.

### ***Be prepared***

One of the advantages of buying canned software from a reputable dealer is that it will help ensure that the software is maintained. But make sure you are prepared: Dealers get a lot of “tire kickers” in their stores, and those customers who show they're serious will get more attention. One of the best ways to do that is to make an appointment with the dealer and provide him with fairly exact records of present and projected work flow.

Work flow can be assessed quantitatively and qualitatively. Quantitative information would include pages of output per day divided into letters, data, graphs, etc.; size of files needed in active and inactive storage; and the frequency of backup needed. A qualitative work-flow assessment would include type of use (field, home, factory, etc.); security needs; reliability required; and, most importantly, the kinds of processing needed (which may entail anything from word processing to industrial graphics) and how much of each. Machines vary in their ability to support some of the more rarefied uses, and some of their limitations could radically narrow a buyer's choice.

### ***What about 16 bits?***

Data flow paths are another essential

variable in information processing. The wider the path (in bits), the greater the data flow. So far, so simple. But understand this simple caveat: Bit-path width isn't necessarily what it seems. Thus, the IBM Personal Computer has a 16-bit processor, but the external data path is 8 bits wide. The Fortune Systems computer has a 16-bit processor (the Motorola 68000) with 32 bits inside, 16 bits outside. And while they're both called 16-bit systems, their overall speed differs.

The Radio Shack Model 16 has both 16-bit and 8-bit processors built in. This lets it run current software while new applications are written. The Model 16 has another nice wrinkle: It uses the 8-bit processor to handle menial duties for the 16-bit chip, to let the latter work even faster. Cromemco is taking a similar tack with its systems—a 16-bit accessory board turns any existing Cromemco into a 1982 New Era computer.

### ***A word of caution***

Remember that the 16-bit machines are new, and because they will almost certainly be refined, a business might do better with three modest 8-bit low-end personal computers than with one high-end fantasy machine. As Johnston of Racet Computes puts it: “Why be a pioneer and catch all the arrows? Those three 8-bit systems could have proven software and hardware. They could even share storage with a networked hard-disk drive.”

A \$3000 to \$4000 hard-disk drive from Corvus, Konan, Lobo, Corona or Tecmar can turn many personal computers into high-end systems. These drives provide startling speed-up in disk operations. Hard disks do this by spinning much faster than floppy drives, and by allowing denser and more accurate placement of data on the disk.

There are three reasons for this increase in speed: First, the sealed hard disk is free of dust and other foreign matter. Second, the hard

aluminum disk expands and contracts (with temperature) far less than does the plastic substrate of a floppy. Third, the read/write head doesn't rub on the hard disk as it does on a floppy; instead, it skims just above the disk on a tiny wing, riding on the air currents created by the spin.

These three factors mean the disk drive doesn't need the wide tolerances of a floppy drive. One small Winchester drive (the kind just described here, and the kind of hard disk on almost all personal computers) can take as little room as a single floppy drive, but store the information of up to 54 floppies. On the other hand, some 8-inch floppies can carry more than 1Mbyte (one million bytes), but Winchester drives still work 10 times as fast as these floppy drives, even if they have the same amount of storage.

Of course, nothing's perfect. The precise design of hard disks makes them sensitive to rough handling. And while a combination of two floppy drives and a hard disk provides for easy disk copying, many systems come with just one of each drive.

Hard disks have to be backed up with a copy of their data. Coyne, for example, backs up his hard disk weekly, and he's not satisfied with Apple's suggestion that he write 35 floppies each week or buy a second hard disk. Corvus' Mirror backup uses common VTR (video tape recorder) cartridges to store tremendous amounts of data; this is one of several ways to attack the backup problem.

There are other paths to high-volume storage. Small floppies can store 720k on the North Star Advantage, one of a new breed of smaller personal systems. A large-floppy, two-drive system can store more than 2 Mbytes (around 320,000 words). Floppy drives don't offer the cost/byte advantage of Winchester drives, but there's no money saved in

*(continued on page 97)*



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## LEISURE

# Keyboard Charisma— Making Music By Computer

The pleasures of making music are not necessarily better left to professionals

by Jordan Gold

**T**he fine arts and computers are becoming allies in a way that just a few years ago would have seemed impossible, and music provides one of the strongest cases in point. Relatively recent developments are making computers more familiar to musicians, while at the same time these developments are making music more popular among non-musically talented computer users. Both groups are using personal computers to compose, arrange, listen to music and even learn about it.

Though the challenge and intellectual stimulation increase as the methods become more varied and complex, the act of making music on a computer—even for a novice—is quite simple. No manual dexterity or “talent” is required. As a result, not only those with a strong music background or avid interest, but also those who somehow must get involved with music can benefit—the harried executive, for example, recruited suddenly to help his 10-year old or his college freshman with music homework, could do well to turn to his personal computer for direction and answers.

### *A professional point of view*

But if the idea of making computer music hasn't yet got you in its clutches, consider the voice of experience. Laurie Spiegel, a student of traditional composition at Oxford Univer-

sity and Juilliard in the late 1960s, never thought computers would someday be her instruments. But with a decade of practice in her art, she is now one of the most respected names in the computer-music field.

She has helped design the alphaSyntauri digital synthesizer, given live performances using the computer, written numerous articles (“Making Music From Micros—A Primer,” *Personal Computing*, July 1981), and created an album of computer music called “The Expanding Universe” (on the Philo label, catalog number 9003). Currently writing a book on the subject, she is trying to simplify music for the benefit of both musician and listener, and would like to see music-playing leave the province of manual dexterity completely and enter the realm of total creativity. “We should use our minds more, and our reflexes less,” she says, “and the computer enables us to do that.”

On “The Expanding Universe” Spiegel treats music not as individual notes, but as pure patterns of notes that change in a given way over time. “This allows the musician more intellectual freedom,” she explains. “The user feeds information into the computer and it decides which note to play next. If the resultant music isn't ‘human’ enough, the programmer/musician hasn't put enough of himself into it.” Thus, the user has the opportunity to review, criticize and perfect his work.

Of course, most people haven't acquired the technological and musi-

cal abilities Laurie Spiegel has, and can't use their computers in the same way she does. But there are many different and more simple ways to make and listen to music with computers. One is a method employed by Charles Alexander, a musician from Tyler, Texas.

### *Music and modems*

Alexander rearranges existing well-known songs into computer language on his TRS-80 Model I and sends them to bulletin boards across the country for use by other TRS-80 owners. A bulletin board is a service through which a computer owner calls a phone number, plugs in his computer using a modem, and either enters or receives information.

Alexander has rearranged and sent almost 20 songs in the 10 months he has been writing computer music. His own collection is vast. “I have all types of music in my files,” he says, “from country, to jazz, to pop, to classics.”

One of Alexander's pet causes is bringing computers to music education. “Teaching music by computer is preferable to listening to a professor pound out chords on the piano or talk about them in a lecture,” he says. “With a computer, for instance, a student can learn how chordal structures are built by writing one voice at a time and slowly adding voices. And, he can play the music of the masters. He can directly transcribe sheet music to learn about note patterns and such. The possibilities are endless.”

*Jordan Gold is a Dallas-based writer whose work frequently appears in consumer electronics publications.*



et non exultis superbia  
vultu vestro superbia  
et non exultis superbia

*“Hands on keyboards can create  
not only increased productivity,  
but that harmony we know  
so well as music.”*





***"No software allows you to make a good performance out of a bad one."***

### THE THEORY BEHIND IT

**T**o appreciate the many ways of making music with personal computers, a basic understanding of music theory is necessary.

Music is just a series of waveforms, each represented by the played note. Every instrument produces its own sound (timbre), relative to the waveform it generates. The type of waveform generated depends on four factors: attack time of the sound, the time the note takes to reach its peak; decay time, the time it takes to die into silence; sustain time, the total duration of the note; and release time, the time between notes. When any of these factors is adjusted, the envelope of the wave changes. The result is a different waveform.

The relationship between attack and decay has a great bearing on the type of sound produced. A sharply struck piano note, which often lingers, might have a very fast attack time, but a longer decay. Notes produced in other ways, or by other instruments, may not last as long after reaching their peaks, resulting in completely different sounds. (The quality of sound is partially the result of the shape of the wave that's been generated, whether sine, square, sawtooth or triangular.)

Sustain time, or wavelength, is responsible for pitch. For example, the shorter the wavelength, the higher the pitch. It incorporates frequency, or the number of times a wave can be repeated in a one-second interval. Twenty cycles per second represents a very low, bass-type sound, and twenty thousand, an extremely high-pitched one.

The sounds we hear are analog; they constantly vary in intensity. A computer generates and receives only digital data; that is, data in either an "on" or "off" state, which do not vary in intensity. Musical information is stored in digital form on computers, converted to analog for us to hear, and sent through a playback system.

David Cohen, professor of music at Arizona State University in Tempe, was recently awarded a grant to investigate the use of computers in music instruction. He found that the approach is particularly helpful for students who are slow musical learners.

"On the undergraduate level," says the Juilliard alumnus, "we use computers to help students having problems with their aural skills. In the past, a student who was having problems would listen to cassettes, records or reel-to-reel tapes. Computer instruction is easier because the music a student is trying to notate appears on a monitor. It doesn't replace what was done in class—it supplements it."

Cohen also teaches a graduate course called Computer Literacy for Musicians. "It's a new class to help musicians get over 'computer phobia,'" he says. "We go over different languages such as BASIC, Pascal and Pilot, and help students apply their knowledge in musical terms."

### Gearing up

While music-education computer use is still in its infancy, the computer as an instrument has been toddling for some time. Consequently, several pieces of equipment are on the market that can convert a personal computer into a musical instrument. The least expensive is a synthesizer, Electronic Duet. It is made by Insoft of Portland, Ore., and is written by the author of many pieces of Apple software, Paul Lutus.

"This is the only two-voice synthesizer for the Apple that requires no additional hardware such as a synthesizer board," says Phil Thompson, a programmer at Insoft. "It eliminates the need through a process called carrier frequency modulation." An outside amplifier can thus be connected to the cassette output of the Apple, instead of the outputs of a synthesizer board, as is usually the case.

Another product for the Apple is Apple Super Music Synthesizer, from Applied Engineering of Dallas, Texas. It features a 16-voice capability, quadraphonic sound, and has four white-noise generators for sound effects and drum beats.

### Visuals, too

"The quadraphonic output gives the capability of playing two songs in stereo simultaneously," says Dan Pote, Applied Engineering's president. "And for visual effect, while a song is being played, each voice generated can be observed for frequency and volume."

Pote calls his music board "hobbyist oriented," and says it appeals to two different groups: those who only play songs, since there are 60 or 70 songs written just for it, and those who like to copy sheet music onto the computer and hear it in musical form when played back.

Other hardware includes two boards made by ALF of Denver, Colo., for Apple computers (one for professionals and one for hobbyists), the Mountain Computer Music-System board from Mountain Computer in Scotts Valley, Calif., and a trio of boards for the TRS-80 from Software Affair in Sunnyvale, Calif.: the Orchestra 80, 85 and 90. Other equipment unimportant to hobbyists, but necessary for serious musicians, is a musical instrument; in most cases, a digital synthesizer.

### Ah, yes, the digital!

Using a conventional computer keyboard or joysticks, the musician/programmer can enter a line of music into the computer, push a button, and hear the music played back. That's OK, but pieces of equipment exist that give "real-time feedback," allowing the composer to hear the music as it is input to the computer. Two synthesizers that achieve this on the Apple are the alphaSyntauri digital Music Synthesizer from Syntauri

*(continued on page 117)*



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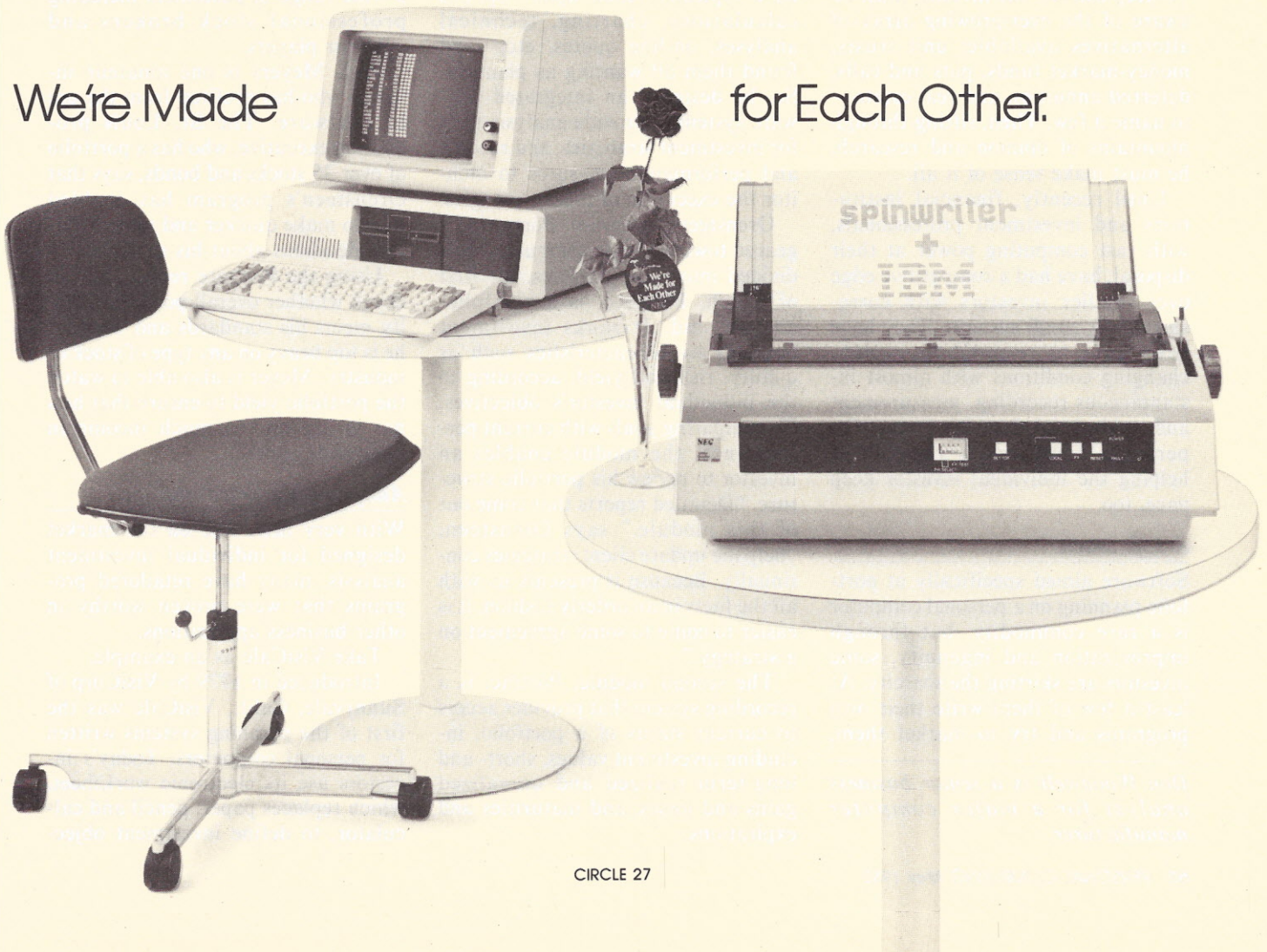
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## Planning Your Portfolio Personally

The economic atmosphere of the early 1980s presents challenges for those seeking financial success.

Personal computers can help the individual investor cope

by Don Woodwell

**L**ike the nemesis of the urban cowboy, the mechanical bull, today's securities market is a jolting, volatile environment, ready to unseat all but the most seasoned investors. New monetary policy, government fiscal actions, and international events contribute to the shaky ride. To keep astride, the investor must be aware of the ever-growing array of alternatives available: unit trusts, money-market funds, puts and calls, deferred annuities, and real estate—to name a few. Then, sifting through mountains of opinion and research, he must make sense of it all.

Until recently, financial institutions and investment professionals, with vast computing power at their disposal, have had a competitive edge over smaller investors with correspondingly small systems. They have been able to respond to rapidly changing conditions with almost instantaneous recording, measurement and analysis of data. But now, the personal computer is capable of helping the individual investor keep pace, too.

### *A soft touch*

Software aimed specifically at portfolio planning on a personal computer is a rare commodity, but through improvisation and ingenuity, some investors are skirting the scarcity. At least a few of them write their own programs and try to market them,

*Don Woodwell is a senior business analyst for a major computer manufacturer.*

while others turn to more traditional business-modeling software, such as VisiCalc, altering it for their purposes.

Dr. Roger B. Orensteen, an investment advisor in Edina, Minn., ran through the range of personal-computer programs that investors have typically relied upon—options calculations, charting, technical analyses, on-line quotes, etc.—and found them all wanting as planners. So, he designed an integrated software system to provide analysis tools for investment strategies, and records and performance measures to monitor the execution of those strategies.

Orensteen's program, Portware, is geared toward Apple computers. It is divided into three modules, the first of which, Portrate, is a portfolio-analysis aid. It ranks investment holdings by characteristics such as quality, risk and yield, according to the individual investor's objectives. By comparing goals with current performance, the module enables an investor to review his portfolio structure. "Detailed reports that come out of this module," says Orensteen, "help me update client strategies continually. Because it presents us with all the facts in an orderly fashion, it is easier to come to some agreement on a strategy."

The second module, Portrac, is a recording system that provides access to current status of a portfolio, including investment values, short- and long-term realized and unrealized gains and losses, and maturities and expirations.

Portrend, the last module, offers monthly and annualized measures of portfolio income return, principle return, and total return.

Orensteen not only uses Portware in his own investment-analysis operation, but also markets it. In the past nine months, he's sold 24 packages to a wide range of customers including professional stock brokers and amateur players.

Rick Meyers is one amateur investor who has profited from the use of Portware. The St. Louis production executive, who has a portfolio of over 35 stocks and bonds, says that Orensteen's program has enabled him to make quicker and more accurate decisions about his portfolio.

Using the Portrate reports he can check whether overall portfolio quality meets his standards and whether he is top heavy on any type of stock or industry. Meyer is also able to watch the portfolio yield to ensure that he's not giving up too much income in pursuit of growth.

### *Adapting the tried and true*

With very little else on the market designed for individual investment analysis, many have retailed programs that were proven worthy in other business applications.

Take VisiCalc as an example.

Introduced in 1979 by VisiCorp of Sunnyvale, Calif., VisiCalc was the first of the planning systems written for personal computers. Today's investors use its electronic worksheet, which replaces paper, pencil and calculator, to define investment objec-



**"Turn your personal computer into a financial saddle on which you can ride through this economically turbulent decade."**

tives and allow them to play "what if" with different alternatives. They enter comparative data on, for example, stocks and bonds, then run the model to determine which investment pays the best total return. The selection of the "best" is thus possible without risking any money.

### **Calculating growth**

Let's examine this capability in greater depth. Suppose your investment plan calls for a balance between stocks and bonds, and you believe that the proper mix will yield a 15 percent annual return over five years. You set up the VisiCalc column headings as your stock or bond evaluation criteria; the rows represent different securities you wish to evaluate. At the intersection, you insert either calculation or data. As a result, you can combine several attractive securities and run a new model to determine whether you can meet the intended 15 percent rate.

The growth of your portfolio can therefore be calculated and compared on a year-to-year basis. Trying other investment mixes and recalculating models will help you gauge the optimum portfolio. Once your decision criteria are set in your models, you can run them repeatedly with new data to assess a variety of alternatives.

VisiCalc has been the right planning aid for Tom Bocock, a stockbroker with Wheat Securities of Norfolk, Va. It allows him to segregate assets within the electronic worksheet, which Bocock finds particularly helpful in analyzing the many investments possible within a single portfolio. He says VisiCalc provides a "fingerprint of the portfolio."

### **Another option**

Another planning aid that appears to work for investors is Desktop Plan, also from VisiCorp. It is less mathematics-oriented than VisiCalc, provides greater modeling capability,

## **PORTFOLIO PLANNING PACKAGES BUYERS' GUIDE**

**A**lthough Portware is one of the few portfolio-planning packages on the market, there are others. Among them are: **Securities Market Analysis Reporting and Transaction System (SMART)** from Software Resources in Cambridge, Mass., which is designed for professionals. This program provides analysis and graphics with a built-in account monitor. Portfolio accounting and reporting will soon be available.

The program runs on a 48k Apple II Plus with a graphics printer, two disk drives and a D.C. Hayes Micro-modem. Although the package is not offered for sale, the company licenses it to customers for a yearly fee of \$1750 for the first year, and \$400 for each continuing year. Under this licensing agreement, the company provides a data service that users can call for daily commodities information or the history of particular securities.

**Portfolio Master 3.1** from Investors Software in San Francisco, Calif., is a general-use package that can handle an unlimited number of portfolios (75 or more per disk) and has seven on-screen reports that can also be printed. It has two additional 80-column printouts—a portfolio summary and a sales-table summary.

The program runs on a 48k Apple II or II Plus with two disk drives and Applesoft in ROM; a modem and a printer are optional. This \$195 program does current value for each portfolio holding based on the last price entered, and holdings can be updated at any time.

One unique feature of the program is its system for keeping track of puts and calls—a flag flashes on the screen next to the option about nine days before expiration.

The **Dow Jones Portfolio Evaluator**, the **Dow Jones Market Analyzer** and the **Dow Jones Portfolio Management System**—these three portfolio packages can be used in conjunction with the Princeton-based Dow Jones News Retrieval Service.

The Portfolio Evaluator, distributed

through any Apple dealer for \$50, runs on the Apple II or II Plus with a minimum of 32k, a disk drive and a modem; a printer is optional. This general-use package stores, modifies, updates and evaluates 100 portfolios with up to 50 stocks in each.

The Market Analyzer, a technical-analysis program for the sophisticated investor, runs on a 48k Apple II with Applesoft in ROM, or on a 48k Apple II Plus. A D.C. Hayes Micromodem or an Apple communications card and one disk drive are required. The price is \$250.

The package, written jointly by Dow Jones and RTR Software in El Paso, Texas, does not evaluate and track stocks, but analyzes them. The user can retrieve and update portfolios, and can access historical information. The package has charting and graphics capabilities, which include charts for moving averages.

The Portfolio Management System was written by Micro Business Systems in Pine Brook, N.J., and is available through Commodore Business Machines in King of Prussia, Penn. The package runs on the Commodore CBM 4032 or 2001, and uses dual disk drives (the Commodore models 4040 or 8050) and a TNW modem.

The program is designed for professional investors and can create portfolios with 100 stocks in each. It can also work with bonds, options, treasury issues and mutual funds.

The price is \$150.

**Computrac**, offered by the Technical Analysis Group in New Orleans, La., offers an automated technical-analysis program for stocks and commodities. This general-use program runs on an Apple II Plus with dual disk drives, and a D.C. Hayes Micromodem; a printer is optional.

For \$1800 for the first year, and a \$200-a-year maintenance fee, users receive telephone support and new programming as it becomes available. The program prints charts, graphs and technical studies, and can be customized to the user's specifications.



## BUSINESS



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**"Gauging the optimum portfolio can be accomplished by trying other investment mixes on your computer."**

and allows multiple use of models. The submodeling feature is especially useful when creating a balance of 20 percent speculative, 30 percent income-producing, and 50 percent high-growth stocks. Each submodel can be joined in a large model, ensuring the best-possible portfolio. Several "dream" portfolios can be built and tracked before any money is actually invested. The "dry-run" feature is the most important benefit of a personal computer. The investor risks nothing but time.

The choices of investments that will meet your financial objectives are many and varied, like roads traveled on a cross-country trip. And the risks and benefits are different with each one. Some alternatives to stocks and bonds include options and commodities trading, investing in tangibles, and speculation in real estate.

All of these investment alternatives have proved profitable in a variety of economic climates. Some investors describe it as almost a sixth sense, but like a street-smart traveler, it requires a certain amount of educated guessing and intuition before choosing which investment road is the correct one to travel.

#### Still a viable route

For some, investing in real estate is still a profitable route. But many questions crop up when studying a piece of real estate. If, for example, you are looking at a multiple-unit apartment complex, you'll need to consider the income you will derive, expenses you will incur, taxes, maintenance costs, and planned capital depreciation. Working out these factors in a buying decision is a complicated process, and the use of a personal computer can be invaluable.

Mike Spivak, executive vice president of TaxVest Inc., in Los Angeles, Calif., uses Micro-Decision Support Systems/Finance, from Ferox Microsystems in Arlington, Va., for his real-estate analysis models. As


Spivak found out, the preparation of an investment plan to meet client objectives is complicated. First needed is a summary sheet showing a 10-year spread on cash flow, taxable income, and gain on sales for both residential and commercial property. A report on the gain- or loss-effect of selling a property each year should also be made. It helps the realtor decide the optimum time to sell. The plan is further complicated by including multiple mortgages in the 10-year spread. DSS/F has allowed Spivak to successfully build such a complex model.

#### Reports versus graphs

Spivak likes the report-generation capability of the system and feels it is especially valuable when dealing with investors, who are usually more attuned to reports than graphs.

DSS/F was patterned after a large computer time-sharing system, and retains many of that system's functions and much of its flexibility. It is more expensive than most programs of its type (\$1500) and requires a three-disk Apple II Plus with Pascal. But its many financial functions, large model-handling capabilities, and built-in graphics for "slide shows" make it attractive to both serious amateur investors and professional financial counselors.

VisiCalc is being used in real-estate investing, as well. It has recently been upgraded to cover increased demands. A new feature is comprised of templates by which a program can help analyze income property investments, personal financial statements, amortization, mortgage loan options, and comparative depreciation schedules.

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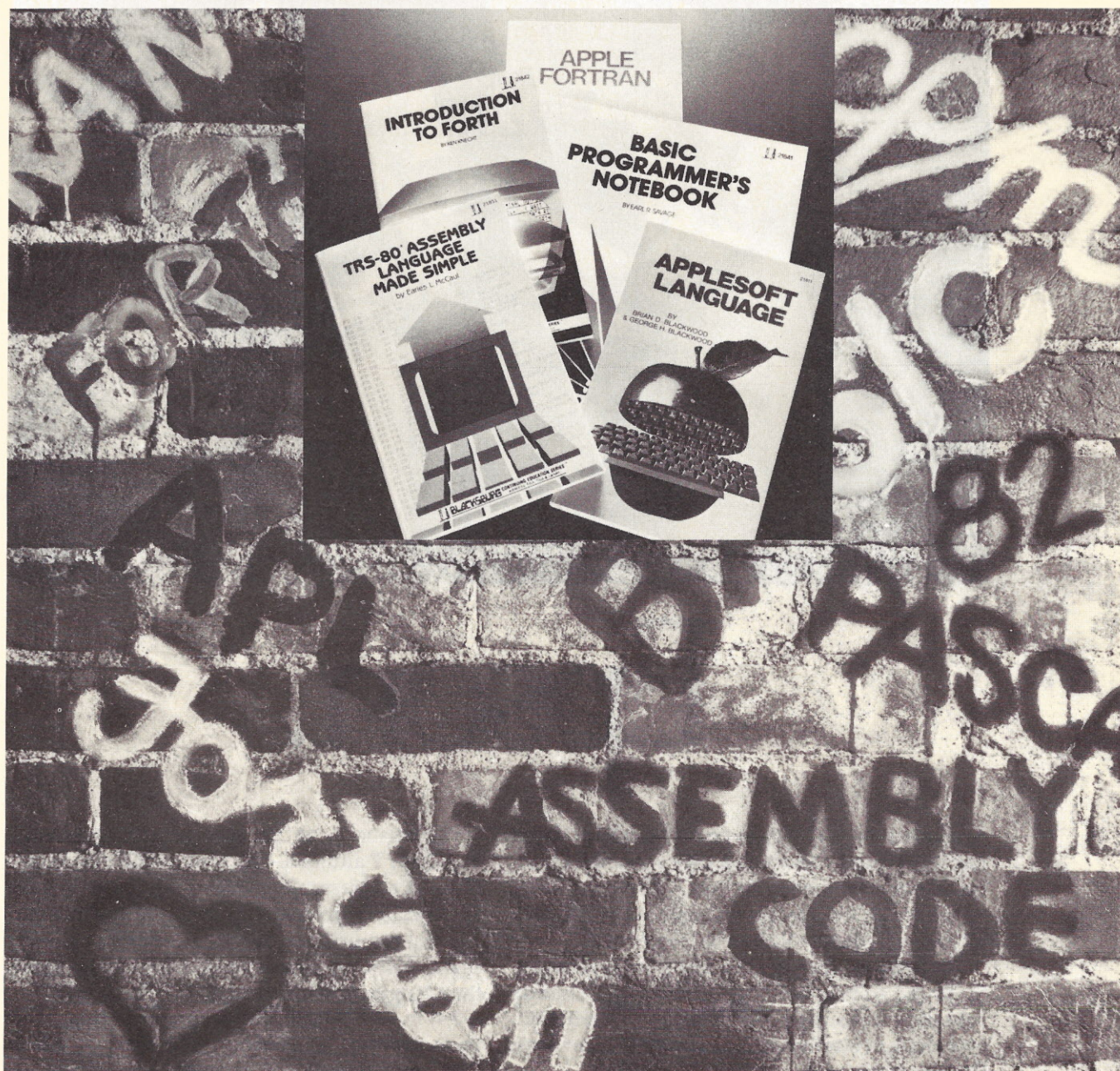


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All in all, they've got the features that make them destined for stardom. But the best part is that beneath this software bonanza beats the



Year	Population
1990	100
2000	100
2010	100
2020	100
2030	100
2040	100
2050	100
2060	100
2070	100
2080	100
2090	100
2100	100

All of which should come as no surprise, especially when you look at the family tree. After all, Epson *invented* digital printers almost seventeen years ago for the 1964 Tokyo Olympics. We were

What's next? Wait and see. We're already expecting.

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## A Programming Primer— Part III

With a little bit of creativity and some logical thinking,  
the programming novice can count himself among  
the ranks of the truly computer literate

by Leon Starr

**D**espite the spread of computers, programming is still a mystery—sometimes a frightening one, at that—to many people. But it needn't be, once you know essentially how computers work, and have a reasonable grasp of the specific language your computer uses.

The second part of this series on programming offered a tour of the entire programming process, from the derivation of a problem for the computer to solve to the translation of the instructions for the machine into a form that it can understand. The first step, of course, is picking a task. Then we broke the task down into components and developed an algorithm of the solution. An algorithm, recall, is nothing more than a set of steps to follow for the methodical solution of a problem. Just as a blueprint is used to build a physical structure, an algorithm is used for a logical structure.

The elements of the algorithm must correspond to the material available to complete the solution—program statements. But the structures of the algorithm can be much more English-like than are program statements. And expressing the idea on paper first in an English-like manner makes the task of casting the solution into obscure programming code much easier.

In this, the third and final installment of the series, we'll take a closer

look at the programming process by solving two simple programming problems.

All programming languages employ different types of structures for the input, output and processing of information. Input structures allow the machine to get information from the user and store it where it can be used later. Processing structures control the order of operations and the storage, retrieval and manipulation of information in the memory. Finally, the output structures are capable of providing information to the user.

With this in mind, let's try solving a simple problem, such as writing a program that will put the following pattern on the screen:

```
*****
*****
*****
****
**
```

It's not easy to move from this definition of the problem to a program, because the statement of the problem is visual. Most programming languages are verbal and need a verbal problem description from which the solution can be developed. To meet this need we must analyze the problem statement given and arrive at a verbal statement:

Place asterisks on the screen in an ordered fashion. There will be five lines of asterisks. The first will have 10 asterisks, and each succeeding line will have two fewer asterisks than the preceeding line. The first line is not indented, but each line

thereafter will be indented one space.

This definition of the problem can be considered an algorithm. It certainly is a verbal program that another person could follow. It may turn out that it is similar enough to programming-language structures to serve as a blueprint for the program that is to be developed. But we need to break the problem down further into the structures in the table to make sure that is the case.

Our verbal instructions should be in one of three categories—input, processing or output. Examining the algorithm, we find there's no need for input structures beyond the writing of the program, since no further information is required of the user. There is output—the printing of the asterisks. We can do this with the print structure in the table. For example, we could say:

```
PRINT "*****"
```

This makes the output seem very simple. However, its very simplicity means that the processing structures we will employ will contain the meat of the program. Their use will therefore require the most thought.

The first processing to take into account is that which will accomplish the printing of the lines. One solution would be the use of five separate PRINT statements. But we won't use this approach, called the brute-force (or hit-it-with-a-big-hammer) approach, because it teaches very little about programming. Instead, it seems fairly straightforward to accomplish the printing with a loop,

*Leon Starr is a principle of Educamp, a firm that trains people in the use of computers.*



*“Many beginners have the false notion that once they learn a computer language they will be able to program.”*

similar to the loops discussed in the second part of this series. Recall that a loop is used when a number of operations are to be performed over and over again. For our problem, the algorithm for the line loop would be: Do the following five times:

Indent a certain amount.

Print some number of asterisks on a line.

This is complete, but it's not easy to translate into the BASIC language. That is because BASIC has no structure for printing specified amounts of things (other languages do have such structures). The print structure only prints out a set of characters on a line. It can't change itself so that one time it prints 10 asterisks and another it prints eight, as is needed.

But there is a way to print the asterisks using a loop, and it is more elegant than the brute-force approach. It begins this way:

Do the following N times:

PRINT “\*”;

Remember that the semicolon after the statement means that the

printer should not move down a line after printing a character. Therefore, when this loop is executed, it will cause N asterisks to be printed on the same line. Changing the value of N changes the number of asterisks to be printed.

We're clearly solving the problem by working on separate, small pieces. This is simply good problem-solving practice. Such practice consists of three basic steps: Break the problem into manageable parts; solve the easy, small parts; and then put the small solutions together into one large whole.

What have we accomplished so far using this approach? At this point the algorithm looks like this:

Do the following five times: (line loop)

Indent a certain amount.

Do the following N times: (print loop)

PRINT “\*”;

Newline.

These two loops will make the program print five lines of N asterisks each. The Newline structure at the

bottom ensures that the next asterisk is printed on another line. It is part of the line loop, but not part of the print loop. This is shown by its single indentation. The print loop is indented twice for clarity. The comments in parentheses are only for clarity, as they would be, in a true program. They have no functional purpose.

If this solution is to work, the value of N must be regulated. N represents the number of times the print loop will be entered. Since for each line a different number of asterisks is to be printed, N needs a starting value of 10 and must be decreased by two each time a new line is started. The algorithm now looks like this:

Give N the value of 10.

Do the following five times:

Indent a certain amount.

Do the following N times:

PRINT “\*”;

Newline

Subtract 2 from N

The first line of our partial algorithm will be executed only once, whereas the last line, part of the line

## EXAMPLES OF SOME COMMON PROGRAMMING ELEMENTS

TYPE	FUNCTION	ALGORITHM STRUCTURE	BASIC LANGUAGE STATEMENTS
INPUT	Get information from user	Put the response in X	INPUT X
	Decision	If condition do something	IF (condition) THEN statement
	Loop	Do these thing 8 times: structure(s)	FOR B = 1 TO 8 statements(s) NEXT B
PROCESSING	Assignment and calculation	Give R the value of 3 add 1 to the current value of C	LET R = 3  LET C = C + 1
OUTPUT	Display information for user	Print “hello” (literal) Print A (value)	PRINT “hello” (literal) PRINT A (value)



## ADVANCED

### INITIALIZING VARIABLES

If variables, which are really locations in the computer's memory to which we can assign values, are given a known value at the start of computation, a program is less likely to develop glitches. This value assignment is called initializing variables, and failure to do it is a common cause of program foul-ups and programmer frustration.

When the computer is turned on, the memory "wakes up" in a random state. Each location in memory (each bit) can have either a "1" or a "0" in it, but there's no way to tell which location has which value, unless the computer sets all memory to zero as part of its "boot" procedure. Few do. So if the programmer needs to know that a certain value resides in location A, he must put that value there.

Look at what happens if the programmer doesn't initialize. In the example shown in the article, L, the low score of the series of test scores, is initialized to 100. Because the tests are graded from 0 to 100, every score that is entered will be less than or equal to L. But if the programmer didn't initialize L, the computer's power-up sequence could have given L a value of -5—or any other random value. Obviously, if location L were -5 no test score would be less than L, and the programmer would certainly be frustrated to find that the lowest score, L, wasn't entered at all. Checking his input won't help, because the error isn't in the input, but in the program, where the simple cause is a failure to initialize the proper variables.

Of course, there are some variables that require no initialization. Examples include those that will have a value definitively assigned as a result of a calculation, and whose value will not be used in any comparisons before that definitive assignment.

loop, will occur five times. The problem of increasing the indentation can be solved similarly. The first line is not indented, but the next line is, and the indent increases by one for each line thereafter. This can be accomplished by using another variable to keep track of the indents, like this:

Give I the value 0.

Give N the value 10.

Do the following five times:

Indent I spaces.

Do the following N times:

PRINT "\*";

Newline.

Subtract 2 from N.

Add 1 to I.

Look over this algorithm. Is there any information missing? Is it simple enough that another person will understand what to do unambiguously? If so, it's ready to be translated into a program.

Now, by using the table, the algorithm can be translated into the BASIC program shown in figure 1.

The program in figure 1 has only a few unfamiliar statements. Last month we saw the IF-THEN-GOTO structure for loops. Here we use the FOR-NEXT statement, which makes it easier to do loops. It does what the "do the following" structure in the algorithm does. The only difference is the need for the NEXT statement in the program that tells the computer to return to the top of the asterisk-printing loop. The indents, which are used to make the program look neater, are unnecessary in BASIC.

The remark statements in the program are there only for clarity, as they were in the algorithm. They do no processing. The TAB statement in line 60 causes the output line to be indented I spaces. Finally, the PRINT statement in line 110 makes the computer go to the next line. It replaces the Newline structure of the algorithm.

Here's a more practical (and complex) problem.

The computer will read in a

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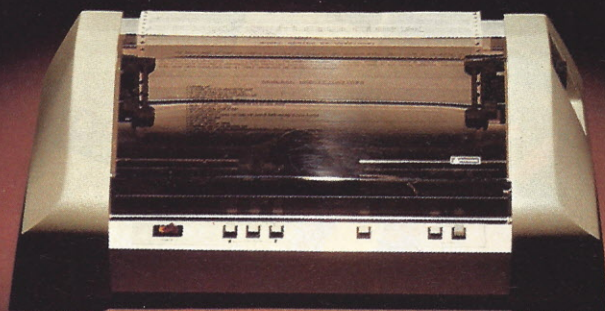
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The full standard ASCII 96 character set, with descenders and underlining of all upper and lower case letters, is printed bi-directionally, with up to 5 crisp copies, at speeds up to 200 CPS. Models DP-9500 and DP-9501 offer 132/158/176 and 132/165/198/220 columns respectively. Print densities are switch- or data-source selectable from 10 to 16.7 characters/inch. All characters can be printed double-width under communications command.

#### Interface Plus

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CIRCLE 33



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## ADVANCED

number of student grades, compute the average of the grades, find the highest and lowest grade, and print all its answers.

This task is easier to program than the last because it's completely verbal. It lists a number of things that must be done, and it's best to do them one at a time. They are:

- Get the total number of grades;
- Read each grade;
- Compute the average;
- Find the lowest grade;
- Find the highest grade;
- Report the answers.

This list is turned into an algorithm by the same thought process that was used with the last problem. But now the program must get input from the user. That's really the only fundamental difference, however, since output is the last step and all the steps in between are processing, just as before.

Two things are necessary to accept input from the user. The user has to know what information is needed, and then the computer must take the user's response and store it in memory.

Our first question will ask the user how many grades will be entered. It

can be represented like this:

Ask for the number of grades to be entered.

Put the response in N.

To enter the grades themselves, we need to ask for a grade a number of times. The loop structure works nicely here:

Ask for a grade value.

Put the response in G.

To find the average, we must first know the formula. It wasn't given, but it's well known that the average of a list is the sum of the numbers in the list divided by the number of items in the list. An easy way to get a sum of values is to keep a running total as the values are entered. That saves storage, since there's no need, according to the problem statement, to keep each of the values in memory. Therefore, we can add a new grade to the value previously stored in G, thereby discarding the old value. It works like this:

Add G to the total (T) and put the sum in T.

Now each G will be added to T and a running total will be kept.

The next task is to determine the highest grade. We can visualize the method of solving this part of the

(continued on page 120)

```

10  REM INITIALIZATION OF POINTERS
20  LET I=0
30  LET N=10
40  REM LINE PRINTING LOOP
50  FOR L= 1 TO 5
60      PRINT TAB(I);
70      REM ASTERISK-PRINTING LOOP
80      FOR A= 1 TO N
90          PRINT "***";
100     NEXT A
110     PRINT
120     LET I=I+1
130     LET N=N-2
140 NEXT L
150 END

```

FIGURE 1

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beat *any* price  
in the U.S.A. on**



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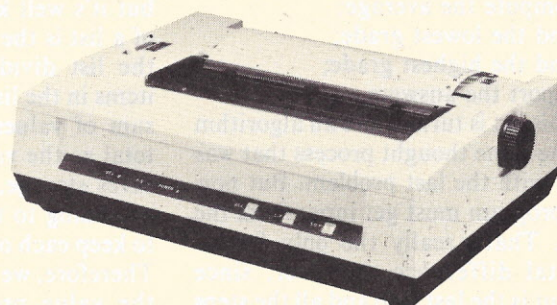
CIRCLE 73



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& 20 mA current loop

TTL compatible, 7-bit

Standard

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## Hollywood Gives Computers The Business

Behind the scenes in Hollywood, some movie and television executives are using personal computers to keep production costs down and determine public reaction

by Ray Loynd

Hollywood's discovery of computers made possible the spectacular special effects seen in "Apocalypse Now," "2001: A Space Odyssey," and "Star Wars." But faced with skyrocketing production budgets, high interest rates which make bank loans hard to swallow, and fickle audiences, some movie and television executives are beginning to feel that the computer's prime influence on Hollywood may, in fact, be far away from the cameras and lights.

Computers could play a more important role, they say, in production offices—testing viewer responses, speeding up script writing and revisions, providing vast research resources; in all, building efficiency and cutting costs in an industry that needs to streamline costs to weather its current hard times.

Phil DeGuere, producer of CBS's "Simon and Simon," swears by the possibilities of using the personal computer to gauge audience response to the just-aired television show. Last year, DeGuere hooked into The Source and asked that data base's 14,000 subscribers to offer reactions to his new detective show. And while he admits that his random polling was not nearly as demographically scientific as that of the 1072 Nielsen households, DeGuere feels that the responses he received over the personal-computer network were far more tangible than those gathered

by television's traditional ratings method.

"The Nielsen numbers that we live and die by can't tell you if people are watching or not," he says. "They only tell you if a set is on and what station it's tuned to; they are not designed to determine public taste. We need new ways to test feedback, and that's where the computer comes in."

### *Tapping audience response*

In his experiment, DeGuere operated through a Compal 8200, 56k dual disk-drive system and elicited reaction to both his show and NBC's police drama "Hill Street Blues." He set up the feedback loop by alerting Source subscribers in the days preceding the broadcasting of the shows that he would welcome viewer response to the telecasts. The first time he requested reactions, only 30 Source users answered; in the second go-round, however, he received 300 opinions. Signifying the generally upscale demographics of consumers who own personal computers, the comments were colorful and articulate: "The role of the liberated women in the show still seems to be very tokenistic." . . . "This show gets pre-empted so often that it's hard to maintain any sense of continuity." . . . "The best TV I've seen in a year." . . . "My concern is how the show can be less soap opera-like."

The value of such access to an audience, DeGuere feels, is incalculable.

"The real point of a computer is communication," he asserts. "To ask for audience feedback over a computer feeds people's urge to be heard; at the same time, it's an incredibly fast way to let a producer know how people feel. If overnight ratings are down, he can ask why, even in specific cities. Alternatives to the great god Nielsen are becoming viable."

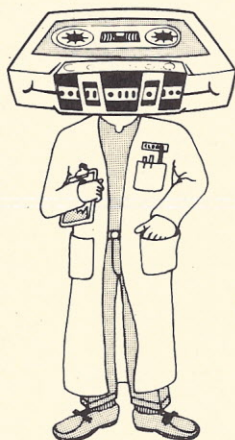
With an initial limited success under his belt, DeGuere convinced his employer, Universal, to outfit his production suite with computer terminals and has already extended the computers' use into cost control and budgeting. The next step, he says, is to make them available for "a new kind of informed decision making." Essentially, the system he envisions will elaborate on the electronic-spreadsheet concept developed in programs like VisiCalc. The "what-if" scenario approach will be used in evaluating various spending categories to reduce unforeseen production overruns that cause soaring budgets.

DeGuere is a pioneer, probably the leading computer proponent in television at the moment. Close behind is Glen Larson, a producer at 20th Century Fox Television, who uses computers extensively, mostly for script work, in his series, "The Fall Guy." Larson's secretaries earned certificates for completing computer training courses, and Fox is preparing its



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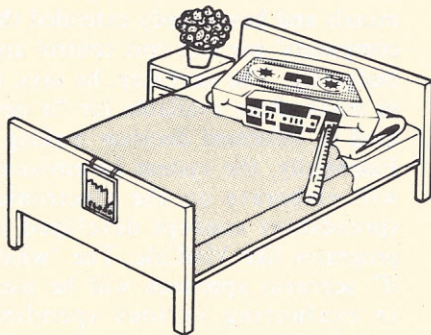
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CIRCLE 58

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CIRCLE 59

## PROFESSIONAL/ MANAGERIAL

whole steno pool to use word processors, which will allow several operators to type into a script at the same time.


### Across the ocean

Larson composes scripts on a Xerox 860 word processor from his home in Hawaii and, over a Dataset 2800 modem, dispatches them to his Hollywood office in five minutes, whereupon they go on a disk and are printed in conventional script form (hour length) in 27 minutes.

"You can move things around so effortlessly," Larson adds. "You don't have to wait for copy to come back from a typist, and you don't have to follow hand-drawn arrows all over the page and into the margins. The writer doesn't have to cut and paste. Anything that eliminates barriers to your thinking process has to be to your advantage."

Such endorsements have coaxed Hollywood's 5000-member Writers Guild of America to step into the computer age. The union is now holding word-processing seminars for the first time. The sessions are jammed, with four to five word-processing companies taking turns demonstrating their wares in the guild's boardroom on the edge of Beverly Hills.

The seminars are the brainchild of Mel Shavelson, a screenwriter and former president of the union's western branch, who is the guild godfather on the subject of computers. Not only does he use his TRS-80 for script-writing, but he also relies on it for research and information.

Other Hollywood screenwriters who use computers are Academy of Motion Pictures Arts and Sciences president Fay Kanin, and the current president of the Writers Guild of America-west, Frank Pierson. 

*Editor's note: The original story on computers in Hollywood appeared in The Hollywood Reporter, September 30, 1981.*



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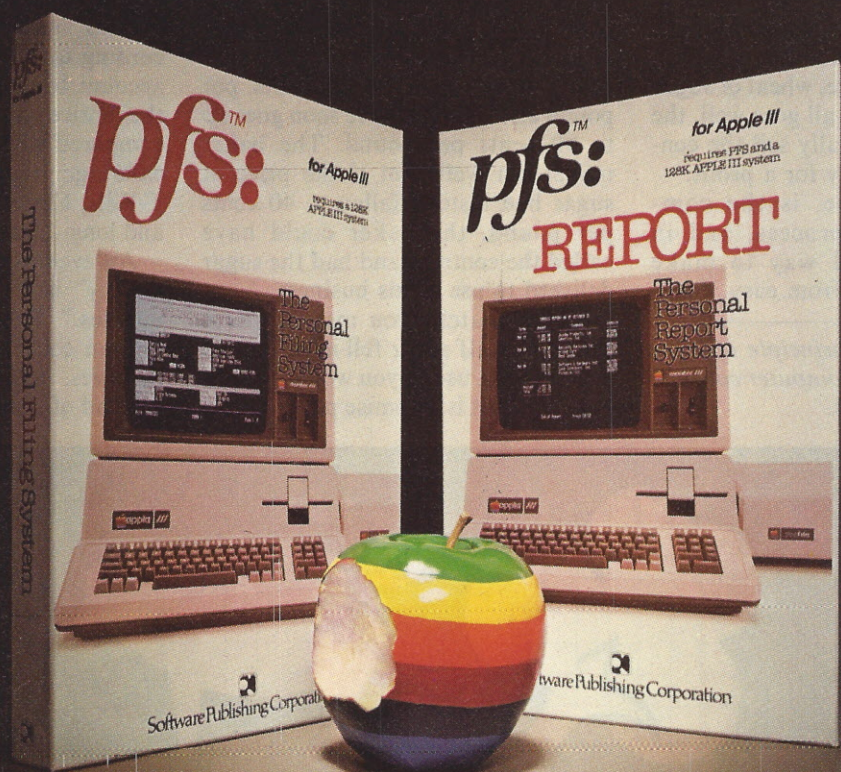
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## BUSINESS

# Commodities Trading: The Computer Exchange

Data-base management programs can give commodities traders an edge in the market by analyzing the myriad factors that could make or break them

by Ben Zander

**C**ommodities trading is a sophisticated, time-consuming, and only sometimes profitable endeavor. But personal-computer owners who like to take financial risks have an edge: These machines, to some extent, are able to cut through the many layers of chaff and make bartering commodities a less painfully complicated task.

Put simply, the commodities investor is a gambler who takes the risk that a raw material will appreciate in value over time. The "gambler" buys a contract for a certain raw material, such as copper, coffee, wheat or sugar at a certain price. If all goes well, the gambler will eventually sell the contract to a third party for a profit.

That, in essence, is the commodities-trading process, and in theory it's a good way to make money. But it's far from easy. Com-

modities trading is a tangled set of operations, and before your computer can simplify the deal, you, as a trader, must understand the mechanics of the trade.

### *Taking less risk*

The luckiest people in the commodities markets are those who can actually *use* the commodity contract they buy. For example, a baker who buys a contract for sugar at a certain price takes less risk than those traders who could not use the sugar. Assume for the moment that the baker buys sugar at 70 cents per pound and that the price soon goes up to 90 cents per pound. The baker makes out well. But if the price of sugar had instead fallen to 40 cents per pound, the baker could have called the contract and had the sugar delivered to use at his business.

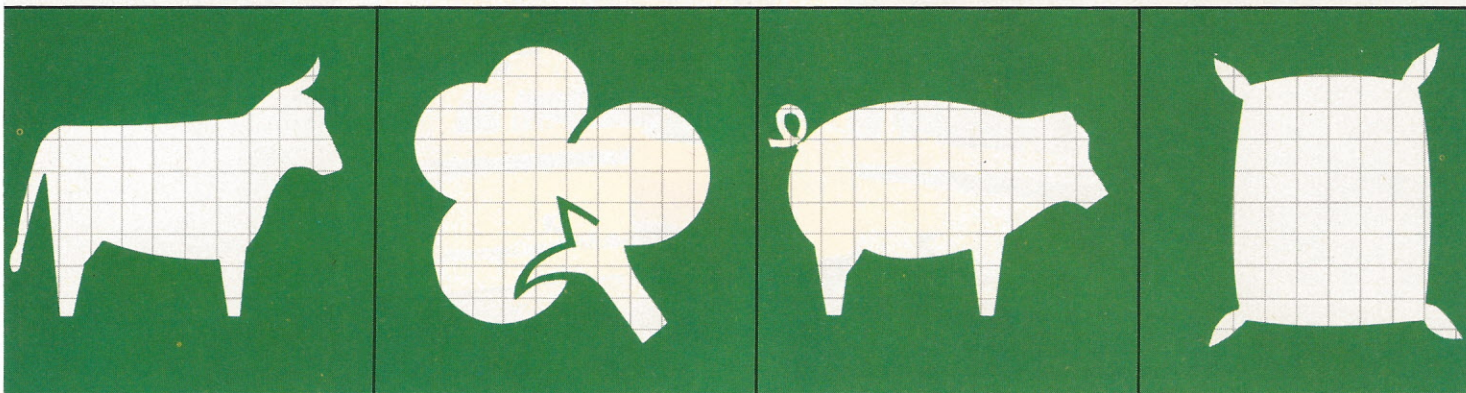
Unfortunately, you may not have that option. If sugar fell in price, and you couldn't use it, you would have to "cover," that is, promise payment (or

transfer payment—in our example, 30 cents per pound) to fulfill the contract. For the most part, the commodity is not delivered to the investor, but bought and sold through and by third parties and brokers. In the event that you couldn't "cover," you'd lose everything—all the money you put in, and the sugar, too.

Of course, not all commodities are raw materials or minerals or foods. One of the hottest areas for the commodities investor is the "financial futures" market. These futures, according to *The Wall Street Journal*, account for more than 30 percent of the entire commodities market, as compared with almost nothing a decade ago. Financial futures include T-Bills, Certificates of Deposit CDs and long- and short-term debentures.

An even more controversial "commodity" is traded in "stock market indexes." These financial offerings are not considered the plum of commodities, because, unlike a CD or a carload of sugar, they cannot be "de-

*Ben Zander is the principle of Zander Productions, a computer consulting firm for lawyers.*





**“There are programs that pull together all the factors you need to know prior to selecting that most lucrative commodities investment.”**

livered.” They are also the first step away from trading in raw goods.

The commodity broker will arrange for your initial purchase of the commodity contract and for the contract's placement with someone who can use the commodity.

The commodities market is far more volatile than the “other” stock market. Some theorists say that only 2 percent affect can be attributed to outside pressures on a stock's volume or price, while outside, non-cyclical forces can affect a commodity's price by as much as 30 to 40 percent.

#### **Cause and effect**

Say, for example, that we again invest in sugar at 70 cents per pound. The sugar is manufactured in Haiti. The next week, there is a strike at the sugar plantation and manufacturing facility. In this example, a direct action involving a commodity caused a price fluctuation.

And there are other possibilities:

- A family decides to sell off a certain precious metal in tremendous quantities. That one family's action can cause the price of the material to bottom out.
- The Organization of Petroleum Exporting Companies decides to boycott the United States.
- The South American Producers Conference refuses to ship one of its products into this country.

If, by now, you've deduced that tracking this mess is more difficult

that you thought, you're absolutely right. But don't give up yet; there are several ways to use a personal computer to help you beat a path through the commodity jungle. Certainly, the most practical and basic way would be to use a simple data-management program to store the names, dates of purchase, and costs of the commodities invested in. This data base can be used to track income, loss, etc. The next step up, of course, would be a data-base management program that takes into account various criteria, and charts news and events that may affect the market.

An even more sophisticated data-management program could assign different weights to historical trends. A historical trend is a cyclical analysis, over time, of a given commodity that is examined at regular intervals. Cycles, that is, repeating patterns of business ups and downs, may be used to predict future trends. The trends or cycles are based on careful study of historically relevant data. The extraction of the “source” data is a large task, and selection of what period of time to study simply compounds the problem.

A comprehensive data-management program used for such cyclical analysis could consist of a record containing approximately 14 fields, and each field (after name, type, purchase, etc.) could contain a different factor. These factors could be weighted using one of several aver-

aging techniques. The results could be used to set up a “scale of prediction” that incorporates the raw data collected to generate the scale.

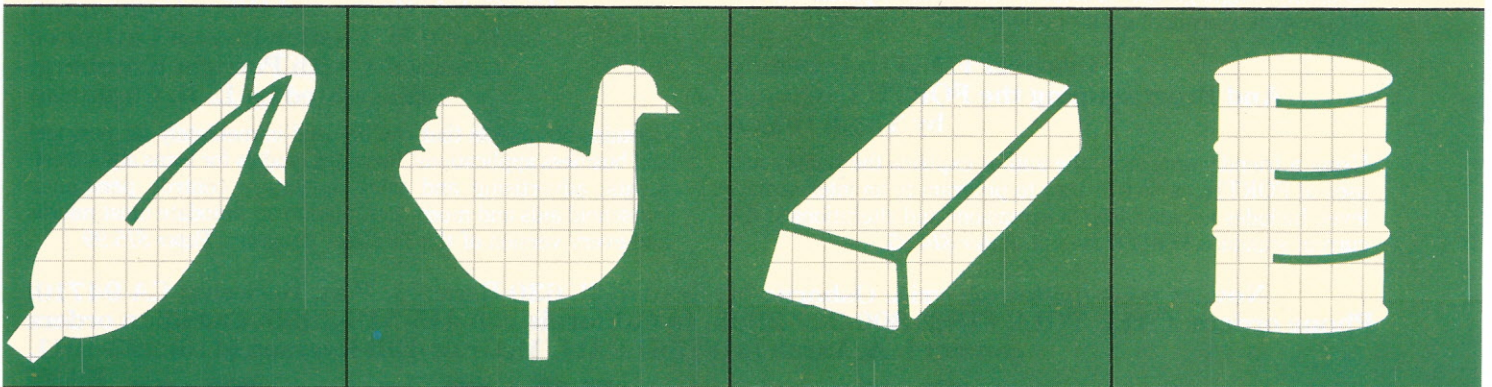
#### **Using VisiCalc**

Another approach to analysis of commodity markets is to use any of the VisiCalc-type spreadsheet programs to construct a trend sample consisting of highs, lows and current market rates. With the average function, weekly, monthly and daily averages can be generated using the “what-if” approach.

Information about how a particular commodity is doing is reported in the print media, such as *The Wall Street Journal* and *Barron's Educational Series, Inc.*, and in the computer-accessible media, such as Dow Jones Online and COMEX. If you dig deeply enough, you can track through the historical price data and determine a range of possibly lucrative commodities in which to invest.

The Technical Analysis Group (TAG—a division of Compu-Trac) in New Orleans, La., offers several programs for the Apple II that “pull” all these factors and actions together. The programs, called “Computrac,” encompass a wide variety of computer-assisted commodity research, acquisition and posting tasks.

The most notable features of this program are its ability to *automatically* dial up a commodity data bank such as the COMEX and ex-



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tract information about the user's areas of interest; collate the data received by a variety of sorting techniques; and print out various charts and graphs to aid in decision making. There are also several index programs that allow for momentum studies of price changes based on historical data as well as current trend analysis. A volume analysis is used to find the relative strengths and weaknesses of given commodities.

The TAG series of programs is a mixed bag. For the novice, many programs will be virtually undecipherable because of the complex theories they encompass. Before investing in commodities, or commodities programs, the prospective investor should investigate the entire field by reading up on it. Two publications

that the investor may find helpful are *New Strategy of Daily Stock Market Timing for Maximum Profit* by Joseph Granville (Prentice Hall, 1976), and *Commodities* magazine, published by Darrell Jobman. You will first have to determine what you want out of your commodities program: Histogram or printed word? Charts, pie graphs or listings?

#### Information available

The "big boys" in the market (COMEX, AMEX) have been using computers for years, but they were limited to the listing of name, volume, price, and highs and lows for the day, week, or month. But much more information has become available. Detailed histograms tracking activity in hundreds of different ways are now

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That same power is quickly trickling down to the personal-computer user, as is evidenced by the sophistication and user friendliness of the TAG programs. There is clearly a powerful push to transfer the technology of the programs developed for mainframes to today's personal computers.

*Editor's note: The investment methods and advice presented here are designed to assist people in making their own decisions in connection with investments. There's no magic in these methods. Any stock-market results which may have occurred in the past may not recur in the future. It is always possible that some unforeseen factor or event may be present.*



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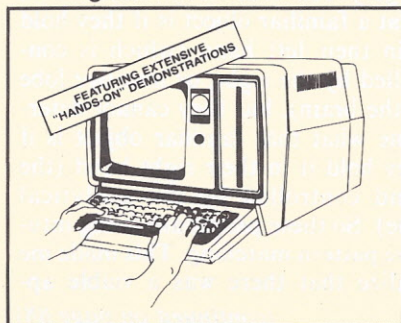
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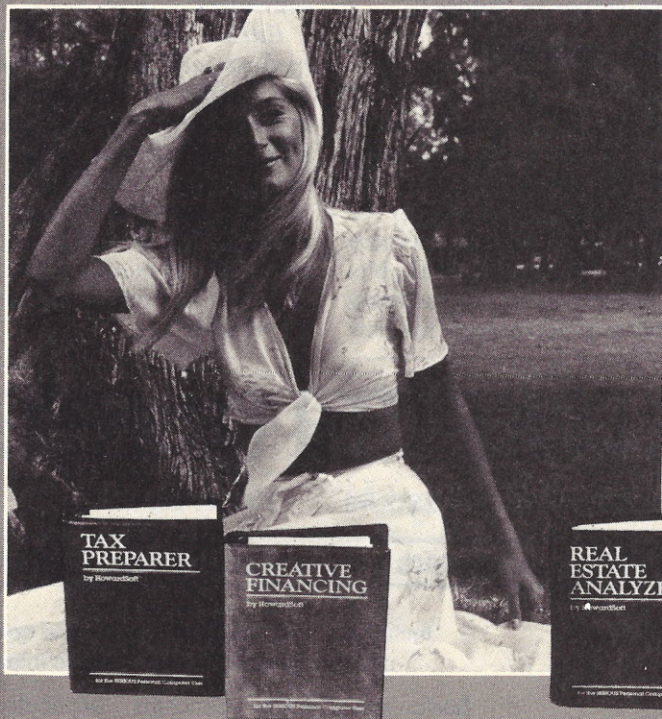




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## INTERVIEW

### INTERVIEW

(continued from page 31)

code SAVVY generated for you, then you can modify it yourself.

**PERSONAL COMPUTING:** How did you get started on this?

**Dowe:** It goes back quite a ways. I had an interest in artificial intelligence for a number of years. The concept of SAVVY was developed when I was working for a company called Farm Information Machinery, which sells computers to farmers. That company sold all the rights on that concept to my company.

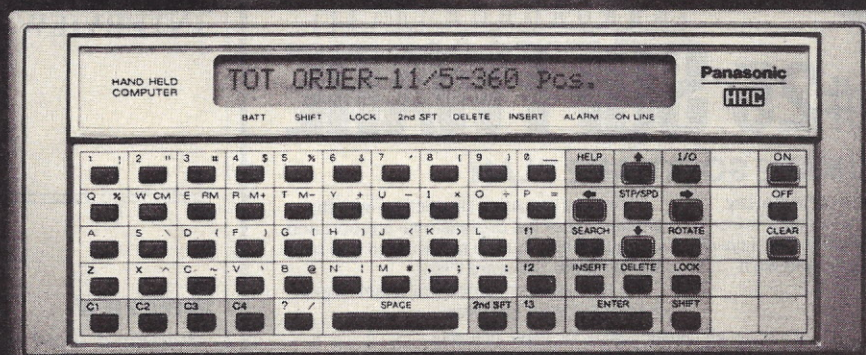
**PERSONAL COMPUTING:** One would expect that it requires a terrific amount of memory for pattern recognition, and that there's just no way around that need. But you seem to have found a way to avoid this problem. What was the spark that led you to a solution?

**Dowe:** There were two sparks. One concerned the work done by Ivan Browning on the neural net (I became aware of that work about five or six years ago); and the other was Julian Jaynes' book, *The Origin of Consciousness in the Breakdown of the Bicommental Mind*. (Houghton Mifflin, 1976). When I put those together with some of the work I had been doing, it was the start of the breakthrough.

Jaynes points out that some of the pattern matching that goes on in the brain is not primarily analytical, but intuitive. For example, people who have had a certain kind of brain surgery can tell, when blindfolded, what a familiar object is if they hold it in their left hand (which is controlled by the right, or intuitive lobe of the brain), but they cannot determine what that familiar object is if they hold it in their right hand (the hand controlled by the analytical lobe). So these people are doing intuitive pattern matching. This made me realize that there was a viable ap-

(continued on page 88)



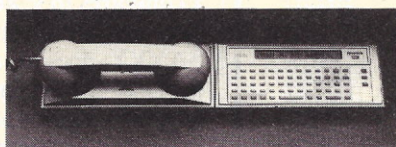


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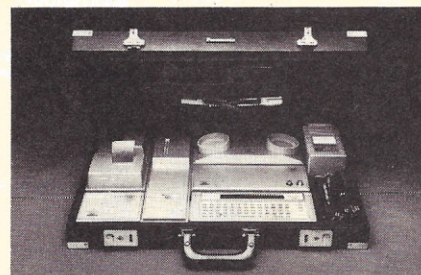


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## INTERVIEW

### INTERVIEW

(continued from page 86)

proach to pattern matching other than the analytical approach. That's when the results came.

**PERSONAL COMPUTING:** You said before that you could describe this as artificial intuition. What exactly do you mean by intuition?

**Dowe:** It's a rough feeling about how x compares to y; about how similar or dissimilar two things are. What SAVVY does is measure the similarity or the dissimilarity between an unknown and the patterns it has known or experienced in the past.

**PERSONAL COMPUTING:** Then it does work logically?

**Dowe:** Only in the most elementary and rudimentary way. The only logical aspects of SAVVY are the addition and comparison of numbers—no ANDs, no ORs, no fancy data structures, no complex algorithms, no large tables assigning semantic values or syntactic relationships. The algorithm itself would fit in about 4 kbytes of RAM if it were entirely in software.

**PERSONAL COMPUTING:** Is this the way the human mind works?

**Dowe:** To the best of our understanding the answer is yes, approximately. We have modeled this active neural net of the mind as laid out by Browning, and made a digital implementation of that net. We think we are simulating the neural structure of the mind and how information moves through it.

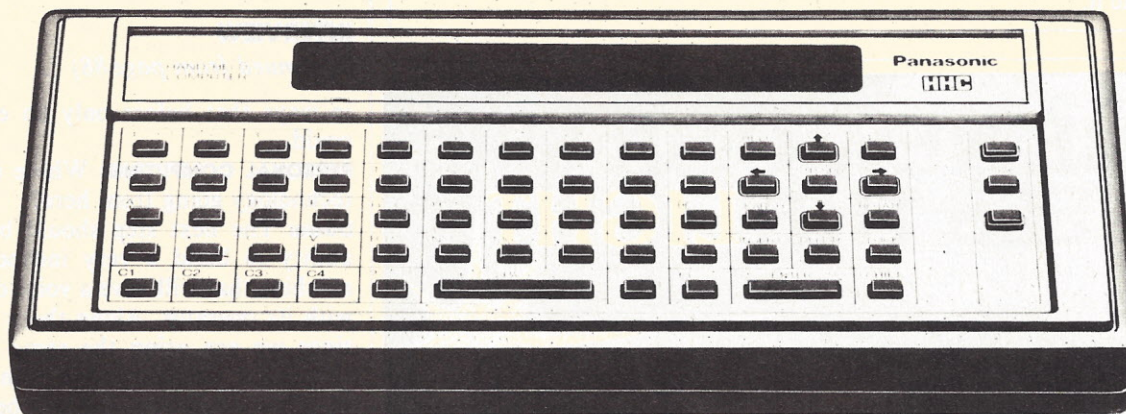
**PERSONAL COMPUTING:** Personal computers have been called human mental-power expanders. Steve Jobs (Apple Computer's chairman) compares the bicycle as a physical-power expander to the computer as a mental-power expander. Do you have a super mind expander here?

**Dowe:** It's an information expander. It helps people work with information

(continued on page 90)



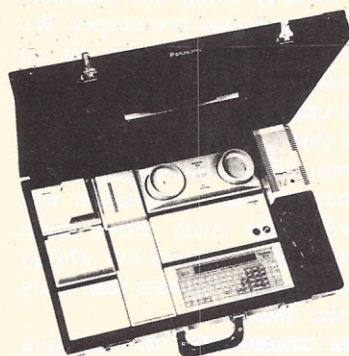
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## INTERVIEW

### INTERVIEW

(continued from page 88)

in ways that before only an expert could.


**PERSONAL COMPUTING:** Where is the technology going from here?

**Dowe:** The next step should be the ability to build a very inexpensive machine that will have a voice dialog with its operator. Along those lines, since we are using the same algorithm for voice recognition and speech compression, you will be able to intermix voice and text freely in your computer, and to transmit them across the telephone lines.

If the work continues to go as well as it has, within two years we should be able to market a small, very inexpensive add-in that would make it as easy to work with voice with your computer as it is to use a keyboard. I don't just mean voice recognition. I mean recognition, synthesis, digitizing and compression of voice for the mixing of voice and text together. We are already doing this routinely on some of our larger prototypes. We have to scale them down to an economically feasible size for a personal computer.

All of this is just another phase in the current information revolution. I think that the next revolution will come when we truly move from having tools that expand our ability to use information to tools that truly expand the mind.

**PERSONAL COMPUTING:** Do you think the rest of the world will come around and see things from your point of view? Will computer processes eventually be based on your algorithm, or refinements of it?

**Dowe:** Let me just say that in the last 60 days we have incurred such a backlog of orders, and work has expanded to such an extent that we can't even think about starting another project for a year. Our customers are major U.S. corporations, and they're buying the concept. 



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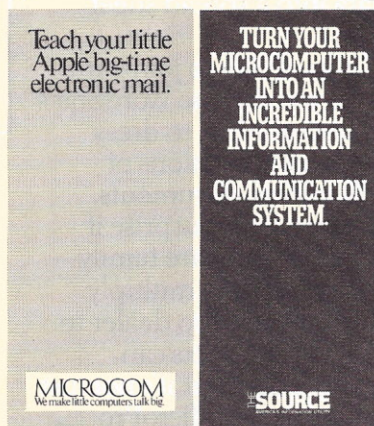
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CIRCLE 38

May 1982 PERSONAL COMPUTING 91



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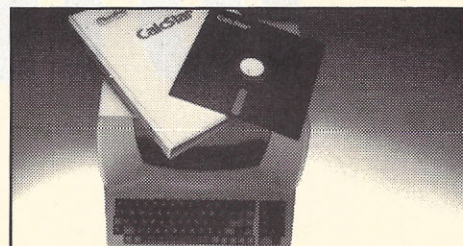
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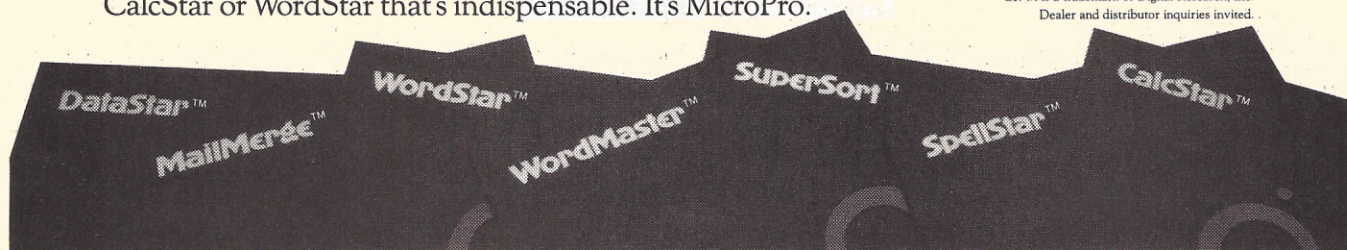
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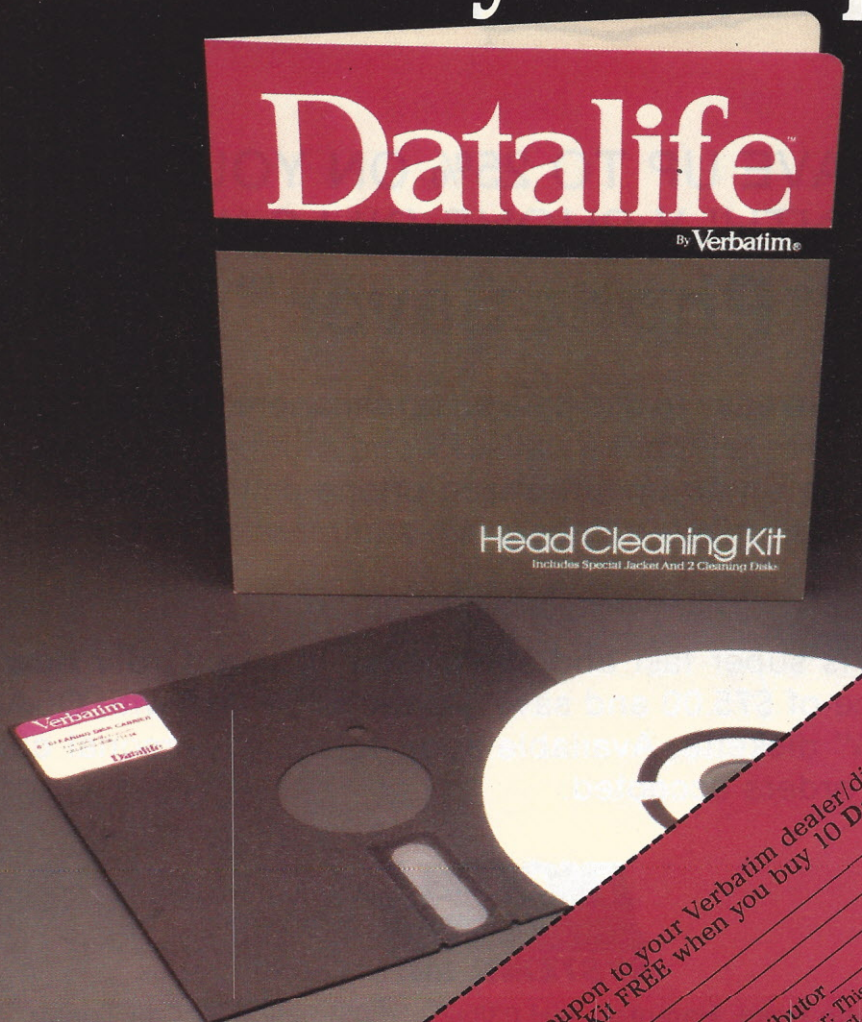
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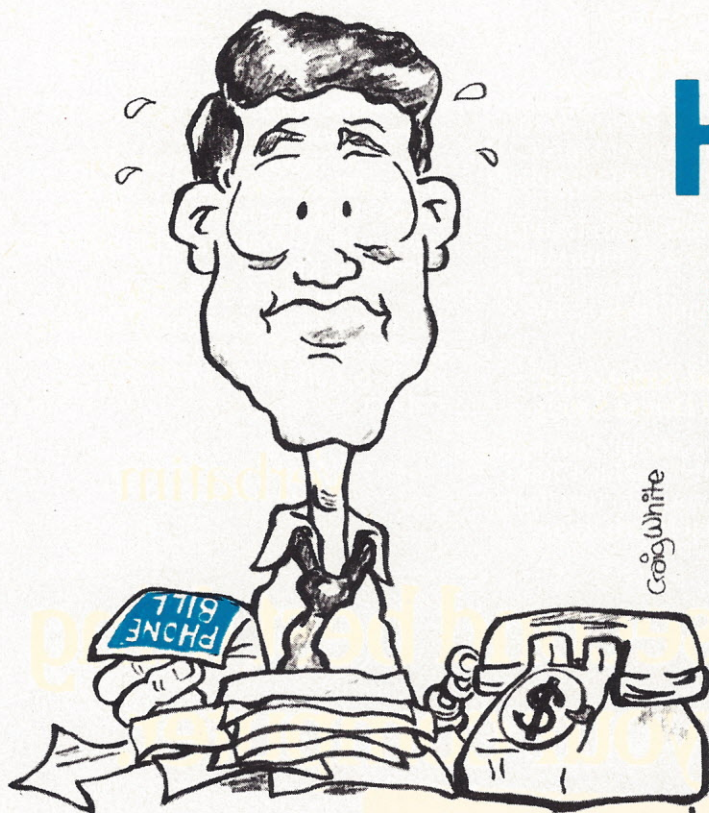


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CIRCLE 40



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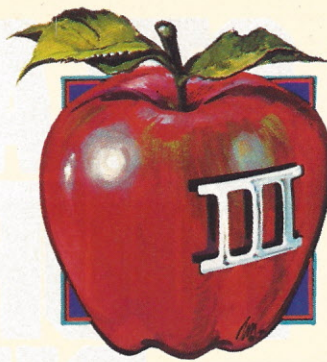
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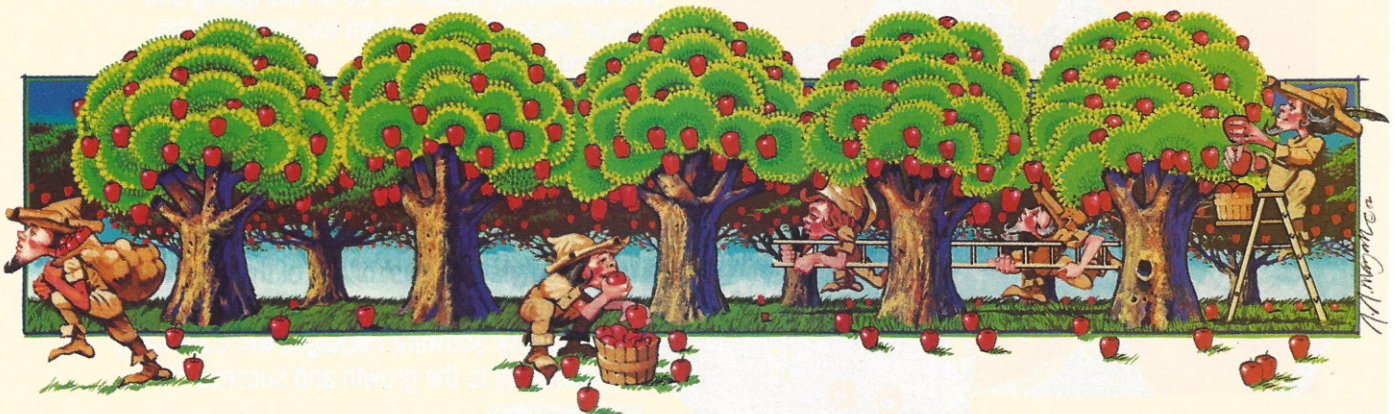
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CIRCLE 42



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make it possible for  
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systems confidently.”***

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**PRICE OF POWER***(continued from page 56)*

opting for a low cost/byte ratio and getting three times the byte capacity needed.

Mike Wigon, assistant to the business manager of *Discover* magazine, a division of Time, Inc., uses a typical multiuser system. His publisher wanted a personal computer because “it was the wave of the future, even though it wasn’t proven yet,” says Wigon. “It’s easy to do something when you have the support of your boss. We were given a mandate to get a system that would run word processing.” He bought the Dynabyte system with three terminals.

At the time of Wigon’s decision, there weren’t a lot of personal computers in the corporate environment. Personal-computer networks, small, hard disks and lower-cost 16-bit machines were still in the pioneering stages. But Wigon knew other Dynabyte users, which made the decision easier. And a reliable dealer was a few blocks away.

Is this personal computing? Maybe not. But it represents a typical multiuser installation. Network installations—several personal computers hooked onto a large storage resource, like a big Winchester disk, for example—have been hard to sell to corporate users, partly because more than one vendor’s equipment has been involved, and partly because the initial cost per workstation is higher than the cost of a terminal to hook onto a computer. Network-using firms assert that the plummeting cost of mass storage is narrowing the price gap. More importantly, many traditional multiuser systems can slow to a crawl when multiple users all try to stuff their work through one 8-bit processor. And if the CPU goes down for any reason, the whole system shuts down.

Given these considerations, it seems only a matter of time before such systems are supplanted by

newer technologies. Meanwhile, they do offer proven solutions and low per-user costs. The proven software alone could make it worth buying one of them. The new technology could be purchased in the next buying cycle, when more software will be available.

***No free lunches***

Despite their advantages, high-end personal systems are complex, costly, often require buying a terminal, and involve sophisticated software considerations. These aren’t compelling reasons not to buy high, but they are good reasons for cautious shopping.

Bob Jones of Paragon Aviation (Annapolis, Md.) followed a carefully charted course that led to the purchase of a DECmate. “About 18 months ago, we developed a great need for information-management,” says Jones, owner of the worldwide brokerage for executive jets and turboprop aircraft. “We have to keep track of 12,000 airplanes and 7500 owner-operators.”

Before deciding on a system, Jones explains, “We identified the functions that we wished to automate by creating a flowchart of the business, but not based on any particular computer. We wanted data-base management and word processing; but most of all, we wanted direct-mail marketing, because it’s much easier to contact pilots by mail than by phone.”

Paragon considered several personal-computer systems, including those from Apple, Radio Shack, Commodore, Wang, Lanier, and Xerox. “On the surface, many of them would do the job,” says Jones, “but they needed some hardware additions. The problem with the little computers was that the system manufacturers did not support every feature we were looking for. We wanted to be able to point a finger in one direction if problems developed. DEC has a toll-free number we can call anytime anything goes wrong.”

Jones’ story contains a warning to computer dealers: In many cases, the

buck stops with them. It behooves dealers to provide thoroughly debugged packages for high-end users.

***Complex solutions needed***

When Bob Jones determined his needs, several factors took him out of the low-end market: His data base required 30 Mbytes of storage; he needed a two-sheet feeder for the printer to put out direct mail; to compose 2000 custom letters a month, he needed to integrate information from the data base into the word processor; and he needed a system that could be upgraded as the need arose.

Jones figured he had to double capacity in two years, but he decided he’d rather grow by getting more computers. “I considered buying a bigger system that could support eight terminals, but I didn’t want to be that dependent on one CPU in case it went down.” With that in mind, he budgeted \$10,000 for the system.

By the time Jones finished charting his needs, only one computer fit them. Systematic needs charting tends to weed out contenders. Given most people’s needs for good, local service and support, and for a machine that can do the job immediately with proven software, the choices are usually narrowed to from one to three systems that can pay for their keep.

Once a user’s myriad needs are determined, he must grapple with several prickly topics. He will be expected to know the nature and value of different bus organizations, for instance. And he may come across features and functions he didn’t know were available. Simply put, the user has to be familiar with the state-of-the-art technology before he can make an intelligent decision on a system.

***Get on the bus***

Proprietary, S-100, multibus, SS-50—these are the most popular buses in use today. Buses connect wiring



to slots so that peripherals can be added or connected to CPUs. [Peripherals are devices—like printers, modems (telecommunications devices), RAM cards for more memory, monitors, and terminals—used with computers.]

Large manufacturers tend to use their own proprietary buses. Apple cards fit only Apples, and even fairly standard connection protocols like IEEE-488 and RS-232-C have to be wired into Apple cards to fit into Apple slots. Standards-making organizations like the Institute of Electrical and Electronics Engineers (IEEE) and the Electronics Institute of America (EIA) have set these and other standards, and they are helpful. But they aren't precise enough to guarantee that two devices using the same standard will work together. Smart buyers always demand to see the buses in action first. As the Prophet said, "Trust in the Lord—but tie your camel first."

Large manufacturers may even require different add-on card designs for their different models. For instance, Apple II cards usually don't fit Apple IIIs, and vice versa.

Some smaller manufacturers use proprietary buses so that other companies can't make peripherals for their machines. Victor Business Systems' new 9000 is an example of a computer that uses such a bus. Victor wants control of the product. This seems to be a growing pattern among the products now coming into the market.

The ultimate way to keep others' peripherals out of one's system is to have no bus at all. Altos uses what's called "single-board design," with built-in plug connections, or ports, on the back. This design allows the standard hookups needed with high-end personal computers. Altos and other single-board manufacturers claim that their simpler design provides higher reliability. There is less versatility in this construction, but unneeded versatility can be a costly

way of asking for trouble. Altos' focus on the office market makes this approach practical.

Cromemco defends the opposite corner as one of the S-100 stalwarts. S-100 computers, which have 100-pin slots and cards, are configured according to an arbitrary standard that is only now gaining acceptance. Before the IEEE's recent ruling on which pins should be wired to which functions, S-100 machines could be wired incompatibly. Now their wiring is more compatible, but there are probably a lot of old machines in use that don't correspond to the new blueprint. Hobbyists, scientists, and engineers favor S-100 and other bus-type computers, like those based on Intel's Multibus, the SS-50 bus (a 50-pin bus used with Motorola's 6809 processor), or the STD Bus (for "simple to design"). These users can fiddle with such computers and adapt them to unique set-ups.

But bus-based computers aren't just for tinkerers. Dynabyte and Cromemco make S-100 computers aimed squarely at business. They point to the expandability of their machines, the number of terminals that can be added, and the fact that there are literally hundreds of special-function circuit cards available for the S-100 bus. This goes for proprietary bus machines as well. The new Radio Shack Model 16 not only has a Z80 card, but it's producing a retrofit card to adapt the Model II to Model 16 configuration, as is Cromemco. In addition to expandability, bus-type machines hold out the promise of users being able to update them. On the other hand, single-board computer manufacturers point to their machines' simplicity, innate reliability, and comparatively low cost. These computers can also be less bulky—sometimes an important consideration.

One of these bus or non-bus structures will be best for the buyer who knows his needs. But be wary of

claims that tout any one type as being fundamentally better than the rest. In a way, the greatest effect of bus designs has been to give small manufacturers the ability to band together to compete with larger firms.

### *You need software, too*

But although expandable bus designs can greatly enlarge a computer's capacity, the machine still depends on software to reach its true potential. High-end computers perform a number of tasks that low-end systems don't. In particular, many of them are aimed at multiple users. High-end software to date has typically been aimed at facilitating multiuser operation. This is especially true of operating systems, which handle the system's "housekeeping" and connect applications programs with hardware. BASIC is the most famous language and CP/M the most famous operating system. Both are accepted as having the widest applications base. They represent a compromise between searching for an ideal and staying with something long enough to develop it into something useful.

Various versions of operating systems and languages (again, with widely varying compatibility) are found in both low- and high-end systems. CP/M-based programs tend to be transportable from one computer to another; however, there are lots of exceptions, as with the S-100 bus.

Aside from CP/M, the most popular multiuser operating systems to date include MP/M, varieties of Unix, and Oasis. Other popular languages include Pascal (in various versions, semi-compatible and semi-transportable, like CP/M-based programs); old standards like FORTRAN and COBOL; and C, which works with Unix. Larger makers like Apple and Tandy tend to have their own operating systems, or their own versions of others'. The same holds true for programming languages: Smaller, professionally oriented makers tend to run



*"Is worker productivity affected by whether they feel they are using a personal computer, a terminal or an institutional system?"*

CP/M for single users, along with other operating systems—some proprietary.

The bottom line for most high-end buyers is that most machines they will consider run on a handful of processors: mainly the Zilog Z80, Rockwell 6502, Motorola 6809 or 68000, and Intel 8086—most with some variation. But while the language picture may seem confusing, there are a small number of common "engines" in systems. In other words, just about every computer will run enough different operating systems and languages to provide the functions needed by the average user. The prime question to be asked is, "Does this computer run the applications software I want to use?" Then, "Do I want user friendliness or muscle; and if I want both, am I willing to pay for them?"

The Apples III's SOS operating system is one of the first specifically designed for friendliness, rather than multiuser capability. All the CP/M-based systems boast the ability to run an enormous number of business software programs, and the promise of adapting them to 8086-based 8/16-bit computers.

There's a lot of truth to these claims; but again, it's no substitute for your data running on each and every program you propose to buy. The business programs only run on a particular CP/M computer when they are customized by the software vendor. This applies especially to disk-format standards, which have virtually no commonality. IBM has a standard for 8-inch disks, but it doesn't allow for high-density data storage; consequently, many 8-inch systems don't use it. And though the 8-inch floppy drive is still popular, the trend is toward small floppies and hard disks.

Networking software has ways of shunting programs between different computers (even different makes of computers, though this is still somewhat experimental). And software

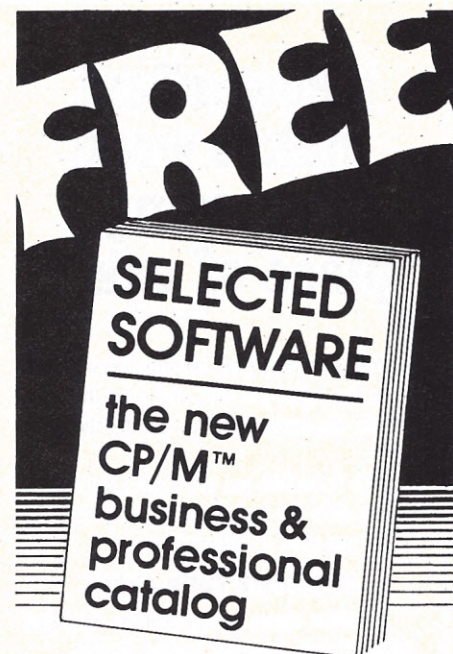
that is dependent on, say, function keys or graphics hardware not found on the user's machine won't work. Industry pundits have predicted that various operating systems will take the lead from CP/M in the '80s, but it's still a crapshoot. Even CP/M could turn out to be the CP/M of the '80s.

#### **Terminals and such**

Fortunately, the features and advantages of one terminal versus another are more clear cut. Most low-end systems come with a built-in monitor and/or keyboard; many high-end systems don't. A terminal is composed of keyboard and monitor, and comes in one of three basic forms: conversational (often called "dumb"), smart, and intelligent. Intelligent terminals verge on being computers without storage. The smart variety allow users to do some editing before communicating with the CPU. (These are good for sharing time on minis and mainframes, but not very useful on high-end personal systems because their smarts are redundant with personal-computer smarts.) Conversational terminals just do what the computer says, and generally relay input to the computer as it is keyed in. They are the choice of most personal-computer buyers.

Terminal prices range from around \$450 to more than \$3000. Some systems require proprietary terminals; others seem to, but do not in fact. The more expensive terminals have programmable function keys and can emulate various other terminals, while low-priced terminals generally lack graphics capability, ergonomic niceties and numerous special-function keys. They may also have lower-quality components. When buying the less expensive terminals, ask the dealer to refer you to customers who have been using them for a while.

Steve Tatum, vice president of marketing and sales for TeleVideo in Sunnyvale, Calif.; sees terminal



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CIRCLE 167



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## SPECIAL REPORT

development branching in two directions, both away from the smart terminal. Multiuser systems with a central unit do everything at home base—only dumb terminals are needed. Networks use intelligent nodes that are computers, with shared, centralized storage. An intelligent terminal could serve as a network node, if the user didn't mind not having local data storage. The HP 125 and the TeleVideo TS 802H are both essentially intelligent terminals with storage and some added electronics, turning them into ergonomically sophisticated computers.

### A touching subject—keyboards

Tatum suggests a number of features to look for in a keyboard. First is N-key rollover, which prevents the loss of letters, no matter how fast the user types. Two- or three-key rollover gives a two- or three-key buffer—past that the terminal starts losing letters. Other critical features include a low-profile keyboard to prevent "kangaroo-arm syndrome," palm rests, and tactile feedback, which lets you know a key has really been depressed. Programmable-function keys are helpful to match software that uses function keys. The alternative is two-key control sequences.

Emulog, based in Fremont, Calif., makes low-priced conversational terminals, and Chris Ryan, director of sales, suggests some other features to look for. He points out that key sizes and "feel" can vary greatly among terminals, and additional function keys sometimes are put in poor places. For instance, on some systems the "break" key can cause a whole system to crash; therefore it shouldn't be next to the carriage return. Many business tasks are eased with a 10-key numeric keypad on the keyboard's right side, Ryan points out, but left-handed users may want to look for a separate numeric keypad. These are available for some machines that don't have one built in.

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## SPECIAL REPORT

Keyboard detachability is a matter of personal preference. North Star Advantage aficionados say that this integrated unit is easy to maneuver and fits in a conventional typing well on a desk. Fans of the detachable keyboard—found on the Radio Shack Models II and 16—say it gives them flexibility. The keyboard can be set on the lap or taken farther from the monitor, which some say eases eyestrain. Tall people usually prefer detachable keyboards, because they can raise the CRT to eye level.

### Getting tired... tired...

Tatum claims that nothing contributes more to operator fatigue than staring into the display screen. Ryan says that cursor addressing—the ability to move the cursor around—is an important terminal feature. He also recommends features that allow for highlight, reverse video, and underlining. But, he adds, "Most nonglare screens create more glare than they stop, and nylon-mesh screens pick up dust, though they do cut glare well." Unfortunately, most devices that reduce glare also reduce resolution. Given a choice, Ryan favors etched CRT faces.

Ryan says most of his customers prefer P31 green phosphor. The Europeans have been pushing amber, but Ryan says that color isn't durable and fades too quickly. White backgrounds, though familiar (they look like paper), tend to flicker and are very contrasty—annoyingly so to some.

Aside from ergonomics, monitor considerations should include graphics, which are standard in expensive terminals. Some low-priced terminals can have graphics capability added later for about \$1000. Graphics software, a digitizing tablet, printer/plotter, and a CRT graphics retrofit would add at least \$4000 to a system's cost. Even if you don't need all this capability to start, it wouldn't hurt to keep the option open by

(continued on page 110)



# High-End Systems: A Buyers' Guide

COMPANY	SAMPLE MODEL	PRICE WITH CPU, 2 MASS STORAGE DEVICES	TYPE OF MASS STORAGE	AMOUNT OF RAM	AMOUNT OF MASS STORAGE	PROCESSOR	OPERATING SYSTEM
A.B. Dick Co. 5700 W. Touhy Ave. Niles, IL 60648 (312) 763-1900 CIRCLE 300	Magna-writer	\$5995	2/5 <sup>1</sup> / <sub>4</sub> " floppy	80k	500k	8085	CP/M
Alpha Microsystems 17881 Sky Park N. Irvine, CA 92714 (714) 957-1404 CIRCLE 301	Will introduce personal bus. system in June	over \$5000	1 floppy, one hard	N/A	N/A	MC68000	AMOS
Altos 2360 Bering Drive San Jose, CA 95131 (408) 946-6700 CIRCLE 302	Series 5-15D with Altos-1 terminal	\$4985	2/5 <sup>1</sup> / <sub>4</sub> " floppy	196k	2M	Z80A	CP/M or OASIS
Apple Computer, Inc. 10260 Bandley Dr. Cupertino, CA 95014 (408) 996-1010 CIRCLE 303	Apple III Profile hard-disk Monitor III	\$7314	1 floppy and 1 hard	128k	5M + 140k	6502	DOS, SOS & Pascal CP/M
Applied Digital Data Systems, Inc. (ADDS) 100 Marcus Blvd. Hauppauge, NY 11788 (516) 231-5400 CIRCLE 304	Multivision 2 Viewpoint terminal	\$9245	2/5 <sup>1</sup> / <sub>4</sub> " floppies 1 hard disk	64k	10M + 700k	Z80A	MUON CP/M
Archives Inc. 404 W. 35th St. Davenport, IA 52803 (319) 386-7400 CIRCLE 305	Model 1	\$5500	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	772k	Z80A	CP/M
Eagle Computer, Inc. 501 Vandell Way Campbell, CA 95008 (408) 379-5452 CIRCLE 306	Eagle IV	\$8995 with accounting + (all 8 modules from systems +) A Spellbinder	1/5 <sup>1</sup> / <sub>4</sub> " floppies & 1 hard disk	64k	7.5M 790k	Z80A	CP/M
Basic Four Info. Sys. 14101 Myford Rd. Tustin, CA 92680 (714) 731-5100 CIRCLE 307	S/10 Portable	about \$7500	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	1.2M	Z80	Boss Level 5
BMC Computer Corp. 860 E. Walnut St. Carson City, CA 90746 (213) 323-2600 CIRCLE 308	If 800 Model 208	\$7950 with integral printer	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	800k	Z80A	CP/M
Burroughs Corporation Burrough Place Detroit, MI 48232 (313) 972-8326 CIRCLE 309	B20 (Hardware from Convergent)	\$8000	2/5 <sup>1</sup> / <sub>4</sub> " floppies	128k	630k	8086	CTOS
Calif. Computer Systems (CCS) 250 Caribbean Dr. Sunnyvale, CA 94086 (408) 734-5811 CIRCLE 310	System 300-3 Ampex terminal	\$5450	2/8" floppies	64k	2.4M	Z80A	CP/M



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## SPECIAL REPORT

(continued)  
**HIGH-END SYSTEMS:  
 A BUYERS' GUIDE**

COMPANY	SAMPLE MODEL	PRICE WITH CPU, 2 MASS STORAGE DEVICES	TYPE OF MASS STORAGE	AMOUNT OF RAM	AMOUNT OF MASS STORAGE	PROCESSOR	OPERATING SYSTEM
Canon USA Inc. 1 Canon Plaza Lake Success, NY 11042 (516) 448-6700 CIRCLE 311	CX-1	\$4995	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	640k	6809	Proprietary
Columbia Data 8990 Route 108 Columbia, MD 21045 CIRCLE 312	964+	\$4995	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	800k	Z80A	
Commodore Int'l. 681 Moore Rd King of Prussia, PA 19406 (215) 337-7100 CIRCLE 313	Superpet with hard disk	\$5685	1/5 <sup>1</sup> / <sub>4</sub> " floppy 1 hard disk	96k	5M + 170k	6502+6809	
Computhink 965 W. Maude Ave. Sunnyvale, CA 94086 (408) 245-4033 CIRCLE 314	Eagle 32 Model 10	\$7500	2/5 <sup>1</sup> / <sub>4</sub> " floppies	128k	1.6M	MC68000	CTOS DOS Fortran & Pascal- Merlin
Corvus Systems 2029 O'Toole San Jose, CA 95131 (408) 946-7700 CIRCLE 315	CONCEPT	\$5000	5 1/4" floppies Winchester disk	512k	up to 80M	MC68000	Pascal
Control Data Corp. 8100 34th Ave. S Minneapolis, MN 55540 (612) 853-8100 CIRCLE 316	110	\$6745	2/8" floppies	64k	2.4M	Z80A	CP/M
Cromemco, Inc. 280 Bernardo Ave Mountain View, CA 94040 (415) 964-7400 CIRCLE 317	CS-1 D2E with ADDS Terminal	\$6190	2/5 <sup>1</sup> / <sub>4</sub> " floppies	256k	780k	MC68000 + Z80	CROMIX CP/M
Data General Corp. 4400 Computer Dr. Westboro, MA 01580 (617) 336-8911 CIRCLE 318	Enterprise 1000 with dot-matrix printer	\$7195	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	716k	Micronova	Proprietary
Delta Products 15392 Assembly Lane Huntington Beach, CA 92649 (714) 898-1492 CIRCLE 319	S2500-01, S1000-17 + Ramcard	\$5012	2/8" floppies	128k	2M	Z80	CP/M
Digilog Business Syst. Park Dr. & Welsh Rd. Montgomeryville, PA 18936 (215) 628-4810 CIRCLE 320	Digilog system 1000 Model 2	\$5695	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	1.6M	Z80	CP/M or Turbo DOS
Digital Equipment Corp. (DEC) 146 Main St. Maynard, MA 01754 (617) 897-5111 CIRCLE 321	DECmate	\$6595	2/8" floppies	64k	1M	proprietary CPU	Proprietary
Dual Systems 720 Channing Way Berkeley, CA 94710 (415) 549-3854 CIRCLE 322	83-06	\$9595	2/8" floppies	256k	2M	MC68000	UNIX
Durango Systems, Inc. 3003 N. First Street San Jose, CA 95134 (408) 946-5000 CIRCLE 323	800	\$8250 with integral dot- matrix printer	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	2M	8085A	DX 85H or CP/M and Star BASIC Proprietary
Dynabyte 521 Cottonwood Dr. Milpitas, CA 95035 CIRCLE 324	Model 5305-A1 w/ADDS Viewpoint terminal	\$5690	2/8" floppies	64k	1.2M	Z80A	CP/M





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(continued)  
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Epic Computer Corp. 7542 Trade Street San Diego, CA 92121 (714) 569-0440 CIRCLE 325	Episode with hard disk	\$7200	1/5 <sup>1</sup> /4" floppy 1 hard disk	64k	10M + 800k	Z80	CP/M
Index (div. of ATV) 2921 S. Daimler St. Santa Ana, CA 92705 (714) 546-3551 CIRCLE 326	9X1 with integral dot-matrix printer, gas plasma display (portable)	\$7680	2/5 <sup>1</sup> /4" floppies	80k	800k	Z80A	CP/M Big-OOS
Fortune Systems 1501 Industrial Road San Carlos, CA 94070 (415) 595-8444 CIRCLE 327	32/16	\$5995	2/5 <sup>1</sup> /4" floppies	128k	1.6M	MC68000	UNIX
Hewlett-Packard Co. 1820 Embarcadero Rd. Palo Alto, CA 94303 CIRCLE 328	H-P 125 Model 10	\$4950	2/5 <sup>1</sup> /4" floppies	64k	500k	Z80A	
Hewlett-Packard PC division 1010 NE Circle Blvd Corvallis, OR 97330 CIRCLE 329	H-P 87 with Z80/CP/M Cartridge	\$5190	2/5 <sup>1</sup> /4" floppies	64k with Z80 48k with 80 CPU	540k	Z80 + series 80 CPU	CP/M + Proprietary
IBC/Integrated Bus. Computers 21592 Marilla St Chatsworth, CA 91311 (213) 882-9007 CIRCLE 330	Cadet	\$5500	2/8" floppies	64k	2M	Z80B	MP/M CP/M OASIS Samos (MDT)
IBM Information Systems 1615 S. Congress Ave Delray Beach, FL 33444 CIRCLE 331	IBM Personal Computer (max. configuration)	\$5196	2/5 <sup>1</sup> /4" floppies	256k	320k	8088	MS/DOS
IBM Dep. 7AG-2RR-238 400 Parsons Pond Dr. Franklin Lakes, NJ 07417 CIRCLE 332	Displaywriter	\$6100	2/8" floppies	160k	1.2M	8088	Proprietary
IBM 1615 Congress Ave Delray Beach, FL 33444 (305) 998-3000 CIRCLE 333	System 23 Datamaster	\$7450	2/8" floppies	64k	2.2M	Proprietary minicomputer design	Built into hardware Proprietary
IMS International 2800 Lockheed Way Carson City, Nevada 89701 (702) 883-7611 CIRCLE 334	5000 SX with terminal	\$5170	2/5 <sup>1</sup> /4" floppies	64k	820k	Z80A	CP/M MP/M Turbo DOS
Intertec Data Sys. 2300 Broad River Rd. Columbia, SC 29210 (803) 798-9100 CIRCLE 335	Compustar VPU-40	\$4995	2/5 <sup>1</sup> /4" floppy	64k	1.4M	Z80A	CP/M
Ithaca Intersystems 1650 Hanshaw Rd Ithaca, NY 14850 (607) 257-0190 CIRCLE 336	Single-user system	\$6000 with terminal	2/5 <sup>1</sup> /4" floppies	64k	1M	Z80B	CP/M
Lanier 43 East Gish Rd San Jose, CA 95112 (408) 293-5844 CIRCLE 337	Computereze	\$6995 with printer	2/5 <sup>1</sup> /4" floppies	128k	560k	Z80	Lexis
Micro Computer Tech. Inc. (MIT) 3304 W. MacArthur Blvd. Santa Ana, CA 92704 (714) 979-9923 CIRCLE 338	Mod III/Winchester (based on Radio Shack Model III)	\$5399	1/5 <sup>1</sup> /4" floppy 1 hard disk	48k	5.7M + 750k	Z80	LDOS DOS TRSDOS NEWDOS 80



*"Too many people are conscious about brand-name computers when they should be thinking about the solution to their problem."*

COMPANY	SAMPLE MODEL	PRICE WITH CPU, 2 MASS STORAGE DEVICES	TYPE OF MASS STORAGE	AMOUNT OF RAM	AMOUNT OF MASS STORAGE	PROCESSOR	OPERATING SYSTEM
Morrow Designs, Inc. 5221 Central Ave. Richmond, CA 94804 (415) 524-2102 CIRCLE 339	Decision 1	\$6500 with terminal	1 floppy 1 hard disk	64k	5M + 500k	Z80	CP/M
M/A-Com OSI (Ohio Scientific) Bedford, MA 01730 CIRCLE 340	C2-D	\$8560 with terminal	1/5 <sup>1</sup> / <sub>4</sub> " floppy 1 hard disk	48k	73M + 275k	6502	
NCR Corp. Stuart & Patterson Blvd. Dayton, OH 45479 CIRCLE 341	Work saver	under \$8000	2/5 <sup>1</sup> / <sub>4</sub> " floppies	256k	630k	8086	CTOS
NEC Info. Systems 5 Militia Drive Lexington, MA 02173 (617) 862-3120 CIRCLE 342	Astra 205-100	\$6500	2/8" floppies	128k	2.4M	16-bit proprietary	Astra-OS
NEC Home Electronics 1401 Estes Ave Elk Grove Village, IL 60007 (312) 228-5900 CIRCLE 343	PC8001 with color monitor (max. configuration)	\$4814	2/5 <sup>1</sup> / <sub>4</sub> " floppies	160k	320k	Z80	
NNC Electronics 15631 Computer Lane Huntington Beach, CA 92649 (714) 896-8000 CIRCLE 344	80W	\$9900 with terminal	1/8" floppy 1 hard disk	64k	10M + 1M	Z80	CP/M
North Star Computer 14440 Catalina St. San Leandro, CA 94577 (415) 357-8500 CIRCLE 345	Advantage	\$6599	1/5 <sup>1</sup> / <sub>4</sub> " floppy 1 hard disk	64k	5M + 360k	Z80A	Graphics CPM; Graphics DOS/ BASIC
Onyx Systems, Inc. Div. of Onyx/MI Inc. 25 E. Trimble Road San Jose, CA 95131 CIRCLE 346	Sundance	\$8495	1 hard disk, + 1 cartridge tape drive	64k	6M	Z80	OASIS or CP/M
Pertec Computer Corp. 12910 Culver Blvd P.O.B. 92300 Los Angeles, CA 90009 (213) 822-9222 CIRCLE 347	PCC 2000	\$10,000	2/8" floppies	64k	1.2M	8085	CP/M
Prodigy Systems, Inc. 497 Lincoln Hwy. Iselin, NJ 08830 (201) 283-2000 CIRCLE 348	Prodigy System I	\$10,000	2/8" floppies	64k	4M	Z80A	Protege
Radio Shack 1300 One Tandy Center Fort Worth, TX 76102 (817) 390-3272 CIRCLE 349	Model 16	\$5798	2/8" floppies	128k	2.5M	Z80A MC68000	Proprietary for 68000; TRSDOS for Z80
Savin Information Systems 1313 Geneva Dr. Sunnyvale, CA 94086 CIRCLE 350	IS 1000 Information Station	\$7750	2/5 <sup>1</sup> / <sub>4</sub> " floppies	256k	630k	8086	CTOS
Seattle Computer 1114 Industry Dr. Seattle, WA 98188 (206) 575-1830 CIRCLE 351	System 2	\$6610 with terminal	2/8" floppies	128k	2.4M	8086	MSDOS
Sharp Electronics Corp. 40 Sharp Plaza Paramus, NJ 07652 (201) 265-5600 CIRCLE 352	YX 3200 System 200	\$6525	2/8" floppies	64k	2.2M	Z80A	CP/M, FDOS



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The Centronics Model 739. Here's proof that inexpensive doesn't have to mean incomplete. The Model 739 will perform just as dependably as the workhorse printers that have made Centronics the leader in printer performance. Look at the key features.

**CORRESPONDENCE QUALITY**—Clear characters, right justified, proportionally spaced for a custom quality printing.

**GRAPHICS**—for business.



Everything from bar charts and curves to illustrations.

**3-WAY PAPER HANDLING**—Cut sheet, roll, fan-folded forms.

**WORLDWIDE SERVICE**—One of the industry's best networks of authorized sales and service dealers and walk-in service centers.

Features plus the backing of more than 350,000 Centronics printers sold are the assurance that the quiet, reliable 739 is the best printer for the price. At your Centronics dealer. Or write directly for details.

### CENTRONICS® PRINTERS

Centronics Data Computer Corp.  
One Wall Street  
Hudson, NH 03051

"See us at NCC Comdex"

CIRCLE 49

# Put your business forms on an Apple II™

An innovative software system that speeds the processing and analysis of common business forms on a personal computer. VersaForm applications include:

- Invoicing
- Purchase orders
- Client billing
- Mailing lists
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- Sales analysis
- Personnel records
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**Approved  
Corvus  
Versions**

## VersaForm

**Business Form Processor**



Applied  
Software  
Technology

15985 Greenwood Rd.  
Monte Sereno, California 95030  
(408) 395-1541

CIRCLE 50

## SPECIAL REPORT

### PRICE OF POWER

(continued from page 102)

getting a graphics-retrofittable terminal.

### Take a test drive

A buyer would be well advised to spend 45 minutes to an hour working at the machine's keyboard and monitor, be it a terminal or integrated computer. Tatum and Ryan agree that it takes time to explore the man/machine interface of a system, but few do this. Instead, they buy whatever the salesman recommends, or they buy the terminal offered by the system manufacturer. That's often safe, but a buyer should at least know he has alternatives, some of which may fit his needs better.

### What's the bottom line?

Generally, certain features are needed for a system to emerge from home/hobby-only into professional use. These include 48k to 64k RAM; one or two floppy disk drives; business/professional software; a 24-line, 80-column display with upper- and lowercase characters; enough graphics ability for simple graphs and charts; and a printer. This combination, no matter what the brand name, will cost from \$3000 with the least expensive printer to \$5000 with a medium-grade, letter-quality printer.

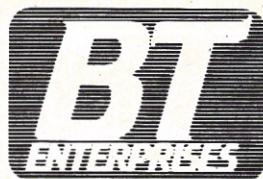
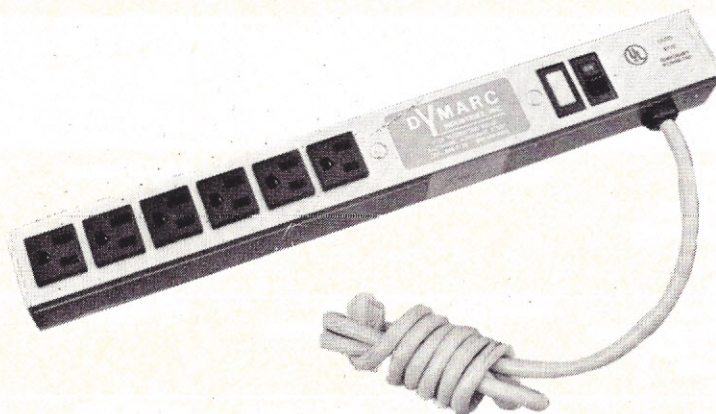
For a high-end professional system, more pickiness is in order. Here, 64k is minimum, and configurations of up to ½ megabyte aren't out of the question. At least two disk drives (one should probably be a hard drive) are also minimum. The display and keyboard, as detailed earlier, should have certain user-friendly features. And the minimum requirements for a printer would be a quality dot-matrix with true descenders on the letters, emphasized mode printing for near letter-quality printing, low noise level and reliability. A communications interface with modem may also be necessary, along with proper furniture to



# Clipstrip™

## TRANSIENT VOLTAGE PROTECTED STRIP

- UL LISTED
- MULTIPLE OUTLETS
- MASTER ON/OFF SWITCH
- RE-SETTABLE CIRCUIT BREAKER
- PILOT LIGHT
- SUPPRESSOR LED INDICATOR
- 6 FT. CORD
- RUGGED METAL CONSTRUCTION
- MULTI-OUTLET \$95.50 . . . SINGLE OUTLET \$68.50

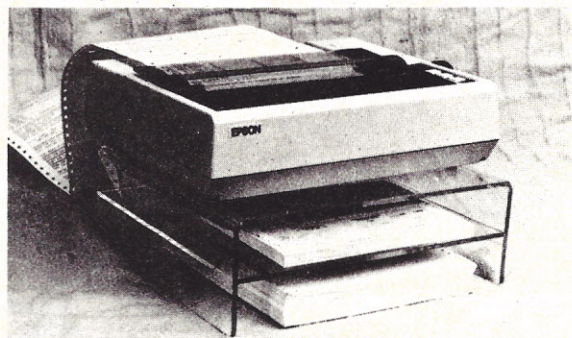


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(516) 588-5836 (modem)



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Dealer Inquiries Welcome  
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Add \$2 shipping - handling  
Prices subject to change



### PRINTER STAND

End the paper mess from your desk-top printer. Paper is fed from under the printer to allow easy stacking behind the printer of the printer output. Extra Shelf (SHOWN ABOVE) is available for easy forms change. Large Stand is available with slot cut for bottom-feed printers (Anadex, etc). Available without shelf only.

Regular .....	(300010)	\$29.95
Regular w/shelf .....	(300011)	\$44.95
Large .....	(300020)	\$34.95
Large w/shelf .....	(300021)	\$49.95
Large w/slot .....	(300050)	\$49.95

### EPSON RIBBON RELOADS

Reload your MX 70/80/100 cartridges with new Black, Red, or Blue ribbon. Just load these silver dollar loops into your old cartridge and save! Buy 12 and save even more! Complete instructions.

Black .. (500000) .....	\$3.95 ea.	Black .. (500001) .....	\$39.50 dz.
Red .... (500010) .....	\$4.95 ea.	Red .... (500011) .....	\$49.95 dz.
Blue.... (500020) .....	\$4.95 ea.	Blue... (500021) .....	\$49.95 dz.

### MX 70/80 CARTRIDGES

MX 70/80 Ribbon Cartridge ..	Black (500050) .....	\$10.95 ea.
MX 70/80 Ribbon Cartridge ..	Red . (500060) .....	\$11.95 ea.
MX 70/80 Ribbon Cartridge ..	Blue . (500070) .....	\$11.95 ea.
MX 70/80 Ribbon Cartridge ..	Black (500051) .....	3 pack \$29.95 pk.
MX 70/80 Ribbon Cartridge ..	Red . (500061) .....	3 pack \$31.95 pk.
MX 70/80 Ribbon Cartridge ..	Blue . (500071) .....	3 pack \$31.95 pk.

### DISKETTES

Elephant Memories Systems Diskettes at a special LOW price !!!

Single Density/Single Sided /Soft Sector .....	500351 .....	\$22.50
Double Density/Single Sided/Soft Sector .....	500352 .....	\$26.50
Double Density/Double Sided/Soft Sector .....	500353 .....	\$32.50

### PORTABLE DISK BULK ERASER

Clean all old data off of your diskettes before reusing them! This is a MUST for your computer room. Easy to use. non-electric. portable!!!  
500102 .....

Only \$4.95



## SPECIAL REPORT

(continued)  
**HIGH-END SYSTEMS:  
 A BUYERS' GUIDE**

COMPANY	SAMPLE MODEL	PRICE WITH CPU, 2 MASS STORAGE DEVICES	TYPE OF MASS STORAGE	AMOUNT OF RAM	AMOUNT OF MASS STORAGE	PROCESSOR	OPERATING SYSTEM
Smoke Signal Broadcasting 31336 Via Colinas Westlake Village, CA 91362 (213) 889-9340 CIRCLE 353	Chieftan 9524	\$5229 with terminal	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	1.5M	6809	DOS 69D, Flex, OS9
Systems Group 1601 W. Orangewood Ave. Orange, CA 92668 (714) 633-4460 CIRCLE 354	Systems 2812	\$6100 with terminal	2/8" floppies	64k	1M	Z80	CP/M
TEI, Inc. 5075 S. Loop E Houston, TX 77033 (713) 738-2300 CIRCLE 355	System 48DL (specifications not finalized)	\$6000 + floppy or tape drive	hard disk (5MB) (floppy or cart. tape optional)	128k	5M	Z80B	Magic, CP/M
Televideo Systems, Inc. 1170 Morse Avenue Sunnyvale, CA 94086 (408) 745-7760 CIRCLE 356	TS802H	\$6995	1/5 <sup>1</sup> / <sub>4</sub> floppy 1 hard disk	64k	10M+500k	Z80A	CP/M
Tarbell Electronics 950 Dovien Pl., Ste. B Carson, CA 90746 (213) 538-4251 CIRCLE 357	Empire 2	\$6028 with terminal	2/8" floppies	64k	2.4M	Z80A	CP/M
Texas Instruments Inc. P.O. Box 202146 Dallas, TX 75220 CIRCLE 358	Business System 200 Model 220	\$6200	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	1.2M	TMS9900	Proprietary
Three Rivers Computer 720 Gross St. Pittsburgh, PA 15224 CIRCLE 359	PERQ	\$29,200	1 Hard + 1 floppy 8"	1024k	12M + 1M	MC68000	CP/M
Toshiba Information Systems 2441 Michelle Drive Tustin, CA 92680 (714) 730-5000 CIRCLE 360	Model 4 T250 with dot matrix printer	\$7000	2/8" floppies	64k	2M	8085A	CP/M
Vector Graphic Inc. 500 N. Ventu Park Rd. Thousand Oaks, CA 91320 (805) 499-5831 CIRCLE 361	2600	\$5195	2/5 <sup>1</sup> / <sub>4</sub> " floppies	64k	1.3M	Z80	CP/M
Victor Bus. Products 3900 N Rockwell St Chicago, IL 60618 (312) 539-8200 CIRCLE 362	9000 Business Computer	\$4995	2/5 <sup>1</sup> / <sub>4</sub> " floppies	128k	1.2M	8088	CP/M 86 MSDOS
Wang Laboratories 1 Industrial Ave Lowell, MA 01851 (617) 459-5000 CIRCLE 363	Wangwriter	\$7700 with printer	2/5 <sup>1</sup> / <sub>4</sub> " floppies	128k	600k	Z80	CP/M
Wicat Systems POB 539 1875 S. State St Orem, UT 84057 (801) 224-6400 CIRCLE 364	System 150 FS	\$6000	2/5 <sup>1</sup> / <sub>4</sub> " floppies	256k	1.4M	MC68000	MCS, Unix, CP/M
Xerox Corp. 6416 Wrenchwood Dallas, TX 75252 CIRCLE 365	860 with partial page display	\$7875 (\$10,300 with full page display)	2/8" floppies	128k	600k	8085	
Zenith Data Systems 100 Milwaukee Ave Glenview, IL 60025 CIRCLE 366	Z90 with one hard drive and 1/8" floppy	\$8890	1 hard drive 1/8" floppy	64k	10M + 1M	Z80	



set the keyboard and monitor (if detachable) at the optimum levels.

An Apple II equipped this way (64k is the most you can stuff into this machine) would start at about \$5000 and jump to \$8000 with the addition of the least expensive hard disk drive; with a letter-quality printer, this system would cost \$10,000. For a full configuration, you would also need a fan and a Z80 processor card to use CP/M business software. This equipment would also be required on other low-end personal computers.

Hard-disk drives cost from \$3000 to about \$4500. Adding just one of these to any small personal computer will kick the cost over \$5000. Graphics that include digitizing tablets (for inputting graphic data) and printer/plotters will add about \$2500, bringing the price of our hypothetical Apple II to \$12,500. A digitizing tablet, which starts at \$800, looks like a small drafting board with a pen attached to it by a cord. Anything that can be drawn or plotted on the tablet is relayed onto the screen and into the computer.

The Apple III wouldn't cost much more than the II when configured for professionals; an Apple III with a good-quality dot-matrix printer costs about \$7800 (or \$8000 with an extended warranty).

Radio Shack's standard Model II costs around \$6800; with the proprietary hard disk, the price is \$10,500. The Model 16 would cost a similar amount, and offers a main computer with two subsidiary terminals for less than \$7500. Other new 16-bit professional systems are priced around \$7000 when configured for a minimum high-end personal workstation.

Software must be added to all this. The price for a basic package, comprising word processor, data-base manager, financial analyst, programming language and operating system, and graphics and commu-

nications software starts at about \$700 but can jump to nearly four times that—assuming that appropriate software exists, of course. Accounting packages and specialized vertical-market packages can cost thousands of dollars each. It's reasonable to assume that a buyer's software investment will surpass his hardware investment in a year or two.

To sum it all up, the total cost for a high-end system, including both hardware and software, ranges from \$6400 for a minimal professional system to more than \$24,000.

Most high-end personal computing starts with a \$5000-\$10,000 investment. Most end users report payback of this investment within a year or two. That's good, since they also report obsolescence (but not uselessness) a year or so after that.

It's possible to start cheaper, though. Take Nevada National Leasing in Reno. Bob Pinkerton, the controller, walked into The Byte Shop in Reno and bought an Apple II with VisiCalc, and an Epson MX100 printer for \$5000. In five months he traded in the II and bought an Apple III with a Profile hard disk drive, a second Apple III with two floppies, a daisywheel printer, Apple Writer III and Access III (communications software). Now he's implementing a general-ledger system from Great Plains Software in Fargo, N.D. Less Mowery, the treasurer, uses the second Apple III more than 20 hours each week and shares it with others like Susan Patent, the assistant controller. But Pinkerton keeps his to himself—he's a true personal high-end user.

The II gave Pinkerton a chance to try personal computing for a relatively small investment. Maybe he should have sprung for the II right off, but that was before Apple resolved the III's teething problems. Maybe he was cautious, but he was still way ahead of most managers.

Where do you stand?



# Save \$2500<sup>00</sup>

Are you faced with having to spend \$3000 and up for a letter-quality printer?

**Mediamix** offers an alternative.



For only \$500 the **Mediamix ETI<sup>2</sup>** lets you connect the IBM Electronic Typewriter Models 50, 60, or 75 to **any** computer. Why invest in two separate machines? Your office typewriter can do both jobs, yielding better type quality, a consistent corporate image and renowned IBM service.



The **ETI<sup>2</sup>** is no simple black box, either. It is a sophisticated micro-computer with 2000 characters of memory, over 39 special commands and the option of doing typesetting on the IBM Model 50.

Write or Call

## MEDIAMIX

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Los Angeles, California 90067  
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# Welcome to the world of **User/Frien**

Software should be easy to use, easy to understand and forgiving when the user makes an incorrect entry.

You don't have to know how to use a computer to use Micro Lab products. The programs are designed to be **error-trapped** and made to get the job done.

## **The Data Factory**

An extremely easy-to-use system with enormous power and flexibility. Data storage on two disks is 225,000 bytes. Relocate records into a new data base; add, delete, or change field lengths anytime.

## **The Invoice Factory**

Not just an invoice maker. It generates statements, aged receivable reports, product or customer reports, sales analyses. Use a new free form, automatic or standard invoice form.

## **Payroll-Manager**

A whole department that doesn't write itself a check. Figures hours and makes all standard deductions plus seven optional deductions and writes the checks. Unbelievably fast, and easy to use.

## **Entertainment**

Test your luck and skill with exciting games from Micro Fun.

Dogfight II	Roach Hotel
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Mad Venture	Palace in Thunderland
Painter Power	U.S. Constitution Tutor
English SAT I	

Software that prompts you  
throughout the program.





# dly Computing

## Wall Streeter

This portfolio management program allows you to enter, by hand or modem, Friday's closing prices, Standard and Poor, Beta ratings, Value line timeliness and safety factors. Use standard formula or make up your own to project buys, sells and holds.

## V Factory

Allows for a marriage between Data Factory and VisiCalc™ files. You can move data in either direction, manipulate it within the chosen program, and store it either way. An exciting tool for research and analysis.

## Asset Manager

Both old and new tax laws are incorporated in this program which uses the straight line method for balance sheets and accelerated method for establishing asset values for amortization and prints tax schedules. 1,000 assets per taxpayer.

## Data Manager III

A data base designed for the Apple III and can be used with floppies or hard disk drive. It will handle as many records as the storage media can handle with total flexibility.

## Tax Manager

For producing federal income taxes and printing the schedules. This easy-to-use program includes the latest tax laws and will remain current with our Extended Warranty option.

## Relocatable Linking Loader

Takes machine language routines that have been designated by an assembler as relocatable, links them together, and then establishes the program at an address the user specifies. Can be used with Language Plus.

## V Blend

Allows users of VisiCalc™ to combine data in multiple VisiCalc™ files, merging the information into a new file.

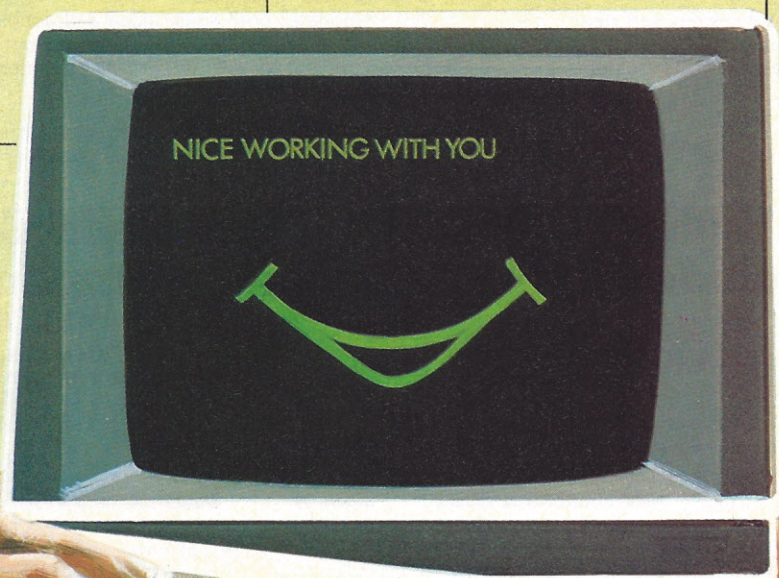
## Merger

A utility for the Data Factory and Invoice Factory. Merge data from fields in either program into those of another file.

## Language Plus

A two volume library of machine language routines. These packages allow users, through Applesoft Basic, to speed up their performance in programming.

Apple and Applesoft are trademarks of Apple Computer, Inc. VisiCalc is a trademark of Personal Software.



## The Learning System

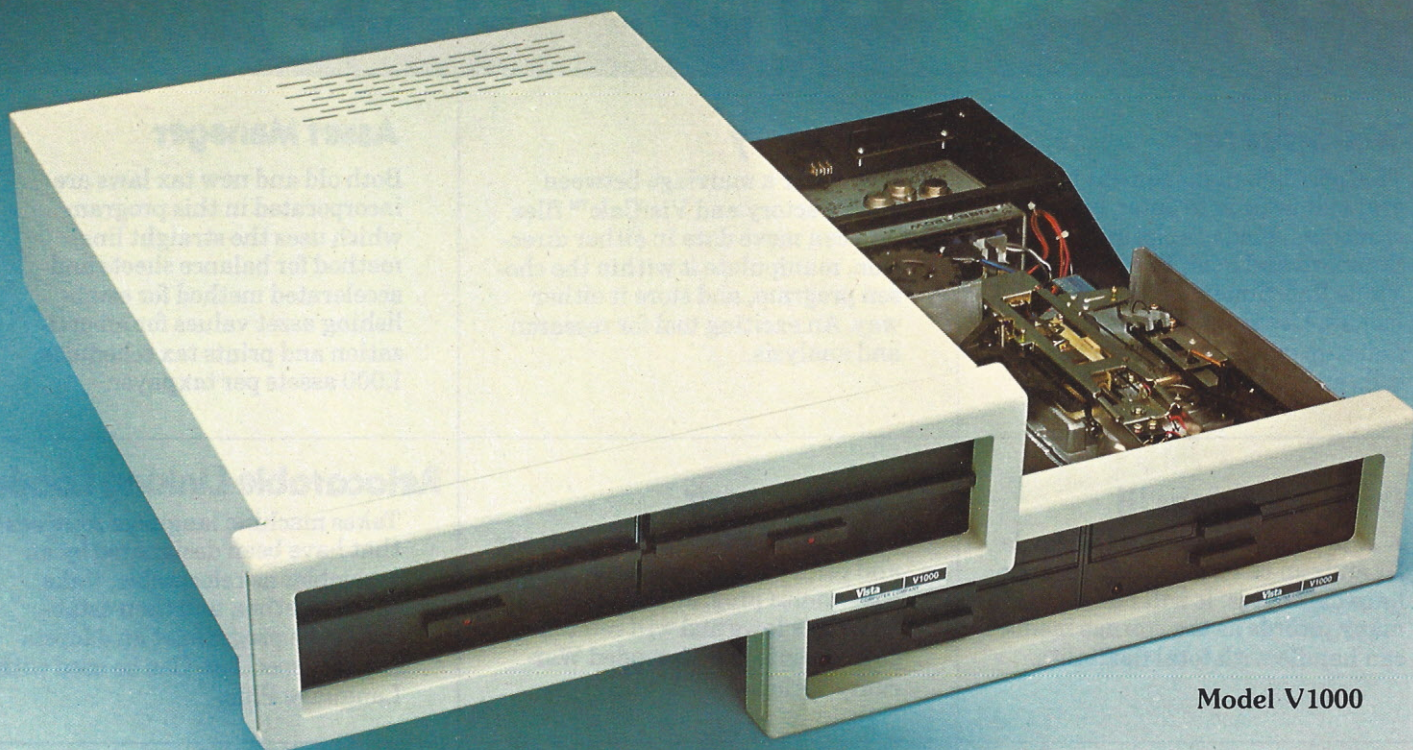
A company or educator may prepare a training/tutoring/testing device. Enter instruction or information; then key it to a tutorial drill or test to check for learning comprehension.



2310 Skokie Valley Road  
Highland Park, Il.  
312-433-7550  
CIRCLE 53



# Vista



Model V1000

## ... Looking Out For You

### Eight Inch Floppy Disk Drive Subsystem Model V1000

The V1000, Vista's sophisticated new disk drive subsystem, sets new standards for ease of access and use. Its innovative design permits disk drives to be mounted or removed quickly and easily for system reconfiguration or servicing.

#### Features:

- Deluxe chassis with internal slide allows easy access
- Storage capacity from 250 kilobytes to 2.5 megabytes

- Desk or rack mountable
- Accommodates both single-sided and double-sided drives
- Industrial quality cabinet with die cast front bezel
- Drives pull out for easy service and maintenance

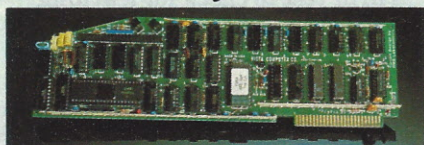
#### Prices:

Cabinet with (2) single-sided drives w/power supply ..... \$1795.00  
 Cabinet with (2) double-sided drives w/power supply .... \$2495.00  
 Cabinet w/power supply ..... \$ 495.00

## Vista's Line of High Performance, High Reliability Products also Includes these Advanced Components

### MODEL A800®

#### Double Density 8" Controller



- Uses all standard Apple DOS commands (OPEN, CATALOG, LOCK, DELETE, LOAD, etc.) except for INIT which has been improved and enhanced in a Vista format routine
- Compatible with Apple DOS 3.3, Pascal 1.1 and CPM 2.2 (with the Z80 soft card by Microsoft)
- 2K x 8 PROM contains Autoboot functions and all eight-inch floppy driver code allowing complete compatibility with Apple DOS 3.3

Suggested price

\$595.00

### EIGHT INCH SYSTEMS

Cabinet with (2) single sided drives w/power supply, A800 controller & cables ..... \$2195.00

Cabinet with (2) double sided drives w/power supply, A800 controller & cables ..... \$2865.00

"Z80 is a registered trademark of ZILOG

"CP/M is a registered trademark of Digital Research

### Vista Computer Company, Inc.

1317 E. Edinger Avenue

Santa Ana, CA 92705

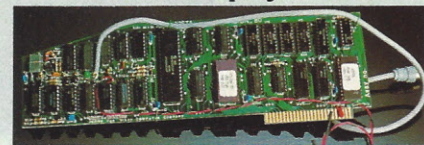
(714) 953-0523

CIRCLE 54

Contact your local dealer.

### VISION 80®

#### Video Display Card



- Full upper and lower case character capability with 3 dot descenders
- 9x10 dot matrix per line U.S. (9x11 Europe)
- 128 ASCII character set
- BASIC, FORTRAN and Pascal languages supported
- Z80™ and CP/M™ compatible
- Compatible with all standard Apple™ peripherals
- Source switches between 40x24 and 80x24 software and hardware

Suggested price

\$395.00



## LEISURE

### KEYBOARD CHARISMA

(continued from page 60)

Corp. in Palo Alto, Calif., and the Sound Chaser from Passport Designs in Half Moon Bay, Calif. More and more musicians are combining these versatile synthesizers with extensive computer-music boards to make "electronic" music a central component in rock and avant-garde musical arrangements.

### Proofreading by computer

Take, for example, Craig Crossman, a professional keyboard player and vocalist in West Palm Beach, Fla. Crossman has a system that consists of the alphaSyntauri digital synthesizer and two boards—an ALF Apple and Mountain. Having written music on computers for three years, Crossman feels it's the best way to compose. "The computer almost

proofreads it for you," he says. "You hear exactly what the music sounds like as you write it, and it comes alive."

"There is no software that allows you to make a good performance out of a bad one," says Laurie Spiegel, the computer composer. "I don't know if that's because many professionals think it's morally wrong to make music more easily."

But Spiegel says she is working on ways to make music composition easier, and throws down the gauntlet to non-musicians. If you are persistent, she contends, making music on your computer may make a composer of you yet.

Still, to many, music and computers may appear to be incompatible. This is because computers haven't yet developed skills to the point that they sound like true instruments.

### MAKING MUSIC: A BUYERS' GUIDE

COMPANY	PRODUCT/PRICE	COMPANY	PRODUCT/PRICE
ALF Products 1448 Estes Denver, CO 80215 (303) 234-0871 CIRCLE 200	The Music Card MC-1 (9 voice), \$195 The Music Card MC-16 (3 voice), \$245	Passport Designs 785 Main St. Half Moon Bay, CA 94019 (415) 726-0280 CIRCLE 204	Sound Chaser, \$650 (keyboard and software) Notewriter, \$99 (add-on software) Musicutor, \$150 (add-on software)
Applied Engineering PO Box 470301 Dallas, TX 75247 (214) 492-2027 CIRCLE 201	Apple Super Music Synthesizer, \$159	Software Affair 858 Rubis Dr. Sunnyvale, CA 94087 (408) 295-9195 CIRCLE 205	Orchestra 80, \$79.95 Orchestra 85, \$129.95 Orchestra 90, \$149.95
Insoft 10175 S.W. Barbur Blvd. Suite 202B Portland, OR 97219 (503) 244-4181 CIRCLE 202	Electronic Duet, \$29.95	Syntauri Corp. 3506 Waverly Palo Alto, CA 94306 (415) 494-1017 CIRCLE 206	alphaSyntauri Music Synthesizer, \$1795
Mountain Computer 300 El Pueblo Scotts Valley, CA 95066 (408) 438-6650 CIRCLE 203	MusicSystem, \$395		

## SOFTWARE

FOR YOUR 16K TRS-80  
COLOR, MODEL I, III  
ATARI 400/800, APPLE II

NOW YOUR  
COMPUTER  
CAN ACT LIKE  
A COMPUTER  
SHOULD....  
WITH OUR  
MAGNETIC  
MAGAZINES,  
YOUR MICRO  
WILL ENTERTAIN,  
EDUCATE, AND  
CHALLENGE YOU.



On cassette or diskette\*, you will receive 6-10 programs every month ranging from games, home entertainment, and personal finance, to more of our unique "teaching" programs.

Our next issue will include:

1. Haunted House Adventure
2. Income Averaging (Schedule G)
3. Hangman with graphics
4. Cryptquote Game
- Plus two of our teaching programs:
5. Writing Utility Programs
6. More on Graphics

You've already missed Stock Market Analysis, Concentration, Checkers, Golf, Algebra and Geometry Tests and Football. Later issues will include Backgammon, Chess, all Tax Schedules, Baseball, and many more. So don't let another issue pass you by! Remember MAGATARI is for the ATARI 400/800; APPLETREE is for the APPLE II+; and TRC is for the MODEL I, III, and the TRS-80 COLOR, so be sure to order the right one. Subscription price for cassette is \$50 per year, \$30 per 1/2 year and \$10 for a trial issue; for diskette \$62 per year, \$36 per 1/2 year, and \$11 for a trial issue. \* (Back issues available on request)

### THE COLOR ACCOUNTANT

With our complete home accounting system, keeping track of your finances can be as easy as PI.

Included in this set of programs are:

1. Chart of Accounts Maintenance
2. Complete Checkbook Maintenance
3. Tax Deduction Flags
4. Net Worth Statement
5. Income Less Expense Statement
6. Complete Graph Package (graphs any files)
7. Payments and Appointments Calendar
8. Home Budget Analysis
9. Mailing List

All programs are menu-driven and allow add/change/delete. Also, all files and statements can be listed to screen or printer, and saved to cassette or diskette. The cost of THE COLOR ACCOUNTANT is \$75 for cassette and \$80 for diskette. This package requires 16K for the TRS-80 COLOR, Model I, III, and Apple II+. However the ATARI 400/800 requires 24K for cassette and 32K for diskette. THE COLOR ACCOUNTANT also comes with 40 pages of documentation.

### the programmer's program



Do you know all the innovative ways of using BASIC commands? The staff at the Programmer's Institute have designed a set of programs explaining everything the manuals omit. The Programmer's Program leads you step by step through the fundamentals of programming your computer. Then you explore the finer points... multiple loops, queues, stacks, game programming, sorts, trees, boolean logic, and memory savers. All these methods make your programming tasks easier and more efficient.

Difficult (and very useful) programs are created before your eyes, and designed so you learn at your own speed! The Programmer's Program is a must for every owner of a microcomputer (\$50 cassette, \$55 diskette).

Order both The Programmer's Program and 1 year's subscription, and the total cost is only \$75 cassette, \$87 diskette. If you order now, you will receive a Football Program and Computerized Telephone Directory ABSOLUTELY FREE with any \$75 order. So don't wait... order today!

### THE PROGRAMMER'S INSTITUTE

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(919) 489-2198

MC & Visa Welcome

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☐ Programmer's Program ☐ Year Subscription  
☐ Color Accountant ☐ 1/2 Year Subscription  
☐ Trial Issue

Type of Computer \_\_\_\_\_  
☐ Cassette ☐ Diskette

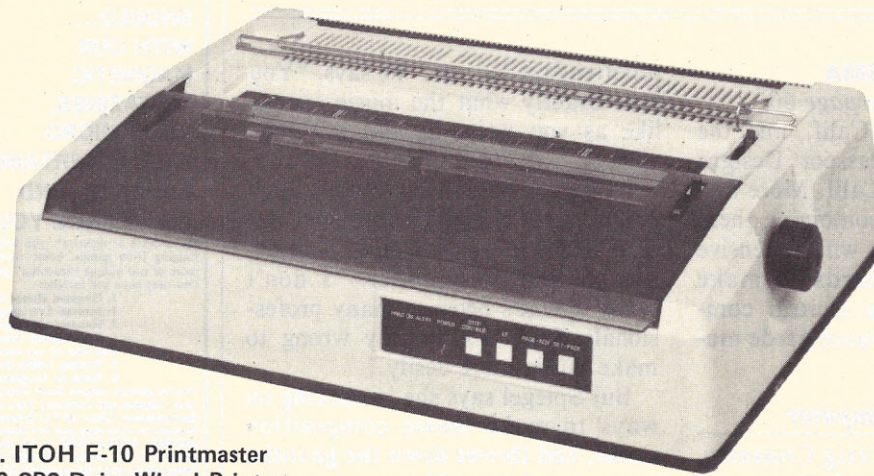
ATARI, TRS-80, and APPLE are trademarks of the Atari, Tandy, and Apple Corp. Programmer's Program, TRC, Appletree, and Magatari are trademarks of the Programmer's Institute.

\*All software available on cassette for ATARI 400/800, APPLE II+, MODEL I, III, COLOR. On Diskette for the APPLE II+, MODEL III, ATARI 400/800.

CIRCLE 66



# \$1295 for a 40 CPS Word Processing Printer ?



**C. ITOH F-10 Printmaster  
40 CPS Daisy Wheel Printer**

## IS THIS THE C. ITOH STARWRITER III?

The **C. ITOH F-10** Printer is manufactured by Tokyo Electric Co., Ltd., (**TEC**), the same company that made the 25 CPS Starwriter I, and the 45 CPS Starwriter II, and you may even see other people calling it the Starwriter III, **TEC 40 CPS**, or just simply **C. ITOH 40 CPS** Printer. By any name this may be the best word processing printer value on the market today. When you compare the standard features with any printer on the market today, we think you will agree.

## INDUSTRY STANDARD FEATURES

Plug compatible with **Diablo**, **Qume**, and **NEC** Printers. Uses standard 96 character plastic print wheels, and the new dual-plastic print wheels that, unlike metal wheels, provide superior print quality over the entire print life of the wheel. Software control characters that are standard for all major word processing packages.

## CONSTRUCTION

Built on a cast aluminum base with high quality metal parts, the unit stands just 6" high, yet will feed paper from the bottom as well as the rear. The solid construction makes the unit low noise and ideal for office or home.

## INTERFACE

RS 232-C interface with XON/OFF and ETX/ACK protocols. Baud rate selectable to 1200 Baud.

## APPLICATIONS

Compatible for use with **Apple**, **Radio Shack**, **IBM**, **NEC**, **Xerox**, **Vector Graphics**, **North Star**, **Altos**, etc.

## OPTIONS

Bi-directional tractor feed, printer stand.

## SPECIFICATIONS

Print Speed	40 CPS
Character Spacing	1/120" (minimum)
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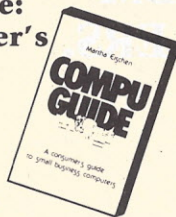


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CIRCLE 120

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CIRCLE 175

## ADVANCED

### PROGRAMMING

(continued from page 77)

problem if we think of the incoming values as a series of playing cards. We also have a wastebasket and a place for the highest card we've seen in our visualization. Now we read in the values of the cards. The first card clearly goes into the high-card spot. When we see the next card, we must decide if it is greater in value or smaller than the first card. We then throw the lower-valued card into the trashcan and place the higher-valued one in the high-card spot or, if it is already there, leave it there. This process continues for all the cards.

The same method works for finding the low card. The algorithm we have so far looks like this:

Make sure T is empty.

Start H with the lowest possible grade.

Start L with the highest possible grade.

Ask for the number of grades—put in N.

Do the following N times:

Ask for a grade.

Put the grade in G.

Add G to the current total, store in T.

If G is greater than H replace H with G.

If G is less than L replace L with G.

Divide T by N and store in A.


The first three lines above are unusual. They are there to ensure we know the values that are being used for high and low. If we didn't do that, we would be unsure of the values with which we are comparing current data. (See the box on page xx.)

When we have finished with the loop, the only task left will be printing the information, often called the report. The last line will be:

Output the values of H, L and A.

One solution to the problem is shown in figure 2.

In this figure, lines 130 and 140 use the symbols ">" and "<." The ">" stands for greater than, and "<" means less than.

*Editor's note: Readers interested in obtaining reprints of parts I and II of this programming series should circle reader service number 210.* 

```

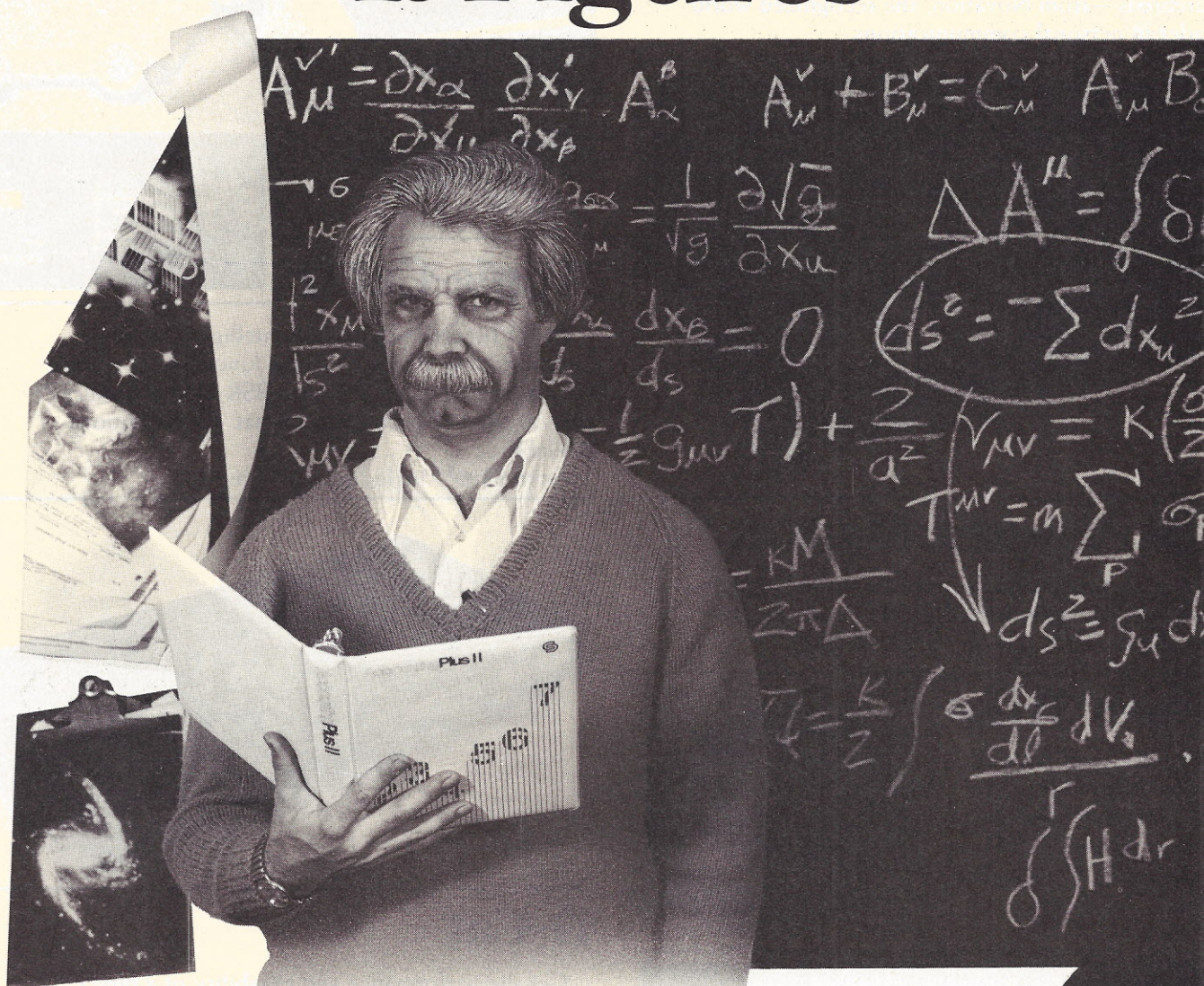
10 REM THIS IS A GRADING PROGRAM
20 REM INITIALIZE THE TOTAL, HIGH AND LOW VARIABLES
30 LET T=0
40 LET H=0
50 LET L=100
60 PRINT "HOW MANY GRADES DO YOU HAVE?"
70 INPUT N
80 REM GRADE ENTERING LOOP
90 FOR C=1 TO N
100     PRINT "ENTER GRADE:"
110     INPUT G
120     LET T=T+G
130     IF(G>H) THEN LET H=G
140     IF(G<L) THEN LET L=G
150 NEXT C
160 PRINT "THE AVERAGE IS" ;A; "THE HIGHEST
    IS" ;H; "THE LOWEST IS" ;L
170 END
    
```

FIGURE 2



# Accounting Plus II

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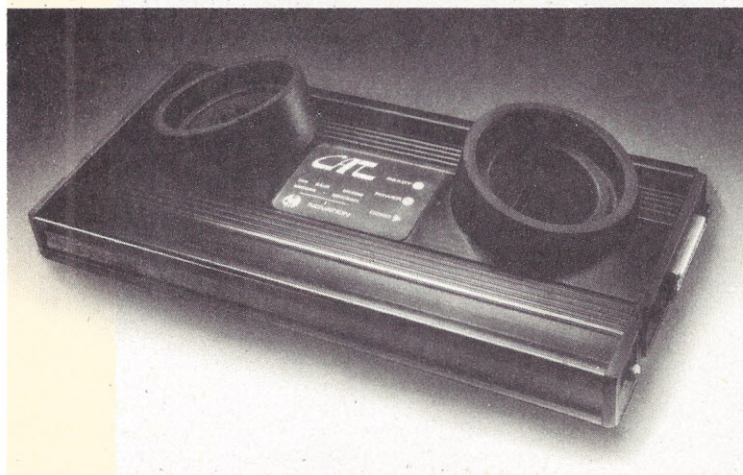
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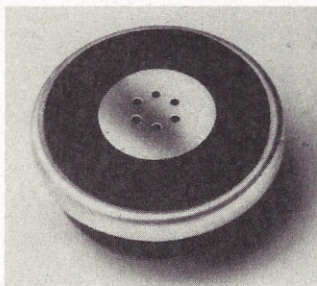
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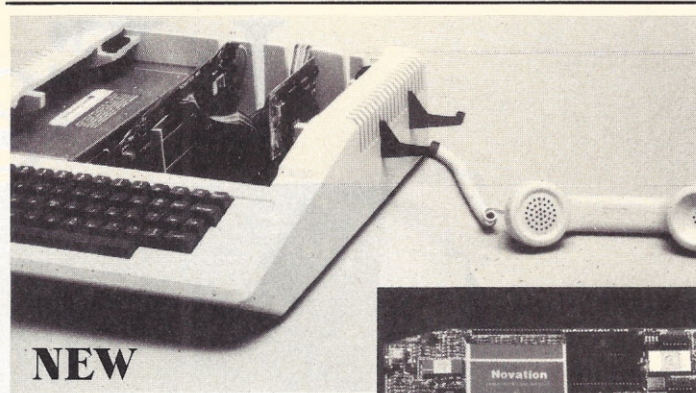
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CIRCLE 57



## On Buying A Personal Computer

Making the correct personal computer buying decision need not send you scurrying for the bromides—not if you've done your homework

by Steve Shendelman

*Editor's note: Buyer's remorse, that insidious disease that plagues us after we've plunked down a sizeable sum on something, is not incurable. As a matter of fact, its effects can be minimized by (1) selecting the right personal computer retailer; and (2) selecting the right personal computer.*

*The following two-part article is presented to aid you in making those selections.*

### PART I

#### Retail Assessment Of Needs

**M**ost dealers and the whole range of so-called personal-computer experts are willing to sermonize about the best equipment or software for a purchaser's needs.

But there is another subject that is often given short shrift by these soap-boxers. It's that vaguely defined, but frequently tossed-about term, support. And the first-time buyer is usually unaware of how important this consideration is until too late.

I have always defined support as the willingness to not only try to answer a buyer's questions, but if necessary to make the "second effort" to get them answered.

It is possible to buy a personal-computer system without this kind of

support, either via mail-order, or from a salesman who extols the virtues of the system with such phrases as "This system is extremely user friendly." This phrase should be taken about as seriously as "Some assembly required." Usually, especially in the first days after delivery, the salesman is the only person to whom the system is even somewhat civil.

So before buying, you should be satisfied with the experience and knowledge of the salesman and the organization selling your choice of equipment. Many people still purchase computer systems by:

- Choosing the machine;
- Finding the program;
- Picking the source dealer.

A better approach is for the purchaser to first define the problem his new system is supposed to solve, and then follow this order:

- Pick the dealer;
- Find the program;
- Choose the machine.

#### *Beware of the 'big sale'*

The right dealer should be more concerned with helping you solve your problem than going for the "big sale." I still believe that if a customer sees that the dealer is genuinely making an effort to find the right solution to the customer's problem, and will follow through to make sure the solution works as promised, then a sale will be made and the customer will be satisfied. It is this attitude towards support that separates good dealers from bad ones.

Many dealers are too eager to take

on new machines or software packages without investing a significant amount of time to determine if the program works, or how much user training is required, or the level and/or quality of support from the supplier. After all, when the inevitable questions begin to arise, the dealer has only one source for answers: the supplier. If that supplier is unavailable or unreliable, then not only does the dealer suffer, but the buyers suffer as well.

As an example, a software supplier recently called me about re-ordering a new accounting package his company had released. We had purchased two copies of the program because the preliminary information sounded good and the supplier had good credentials. I told him we hadn't sold any of the software but that a good customer, a CPA, was reviewing it, and so was one of our own employees. I said that it would be at least another week or so before we would be ready to sell it.

#### *The dealer's obligation*

The supplier was somewhat surprised, and said that one store near him had sold three packages already. He also indicated that he had done the demonstrations in all three cases. When I questioned him about the support of these packages, he said the dealer really wasn't familiar with the package, but would support it anyway. That was good to hear, but I pointed out that customers should not have to call halfway across the country to get answers.

*Steve Shendelman is the manager of Data Domain in Schaumburg, Ill.*



*"Support is so crucial because of this industry's sleeping beast called 'documentation.'"*

The lesson in this story is that the store selling a product has an ethical obligation to stand behind it. Carrying any product implies that the store recommends such merchandise. But consumers should exercise a healthy amount of caveat emptor on their excursions into the world of personal computers.

These concerns I voice are equally applicable to the "Big Boys," as well as to independent, local dealers. Megabucks and a large staff do not guarantee security. All should be subjected to an equally high degree of scrutiny. Large companies are, after all, composed of human beings, and they are all quite capable of misjudging the capabilities of a given product or supplier. In fact, the large size of the organization, which might have been attractive at first glance, might also hamper a quickly needed change in supplier, product or policy, causing expensive delays for the customer.

### *The sleeping beast*

Another reason why support is so crucial in the computer industry is because users must deal with the sleeping beast called "documentation." Even the best documentation requires a certain amount of subjective interpretation; bad documentation requires clairvoyance. Most sophisticated software packages are simply too involved for the user to assimilate in one sitting. One-on-one training sessions are often the only practical answer.

Most reputable dealers will include a certain amount of training with a system sale, and prospective purchasers must consider the cost of this training when comparing prices from various dealers. It is unreasonable to expect full dealer support and rock-bottom pricing. It is highly unrealistic to expect a smooth introduction to the system without support.

It is also necessary for buyers to allow for additional training time beyond what is included with the sys-

tem. While familiarity with word-processing packages comes relatively quickly (two to four hours), accounting packages will take much longer (four to 12 hours). This time span will also increase because of the necessity of slowly integrating the new system with an existing manual system.

### *Questions, questions*

Since it is unlikely, and not recommended, that all modules of a complex package—such as the receivables, payables, payroll and order entry of a business-applications package—be implemented simultaneously, many questions won't arise for weeks or months after the purchase. Therefore, in spite of initial training, additional sessions may be necessary down the road. So your budget should allow two to four hours of extra in-store training at \$20 to \$40 per hour for each major package or module. On-site training is almost double in price.

If the system purchased is in the \$20,000 to \$40,000 range, then these costs are a small percentage of the total investment. Training costs of \$500 to \$1000 on a \$10,000 and under system may, however, be regarded by some to be excessive and difficult to accept. Nevertheless, the size or initial purchase price of a system has very little relation to its operating efficiency. After all, increased productivity is one of the primary motivations for buying the system. Lack of proper support could be responsible for a marked decrease in personal productivity.

### *Too price conscious?*

I have always been amused by the individual who shuns support and comes to us for a system worrying primarily about price. Noisily proclaiming that he can teach himself everything he needs to know about the system, he shops around and buys the lowest priced unit he can find. This individual returns to the store

anywhere from three days to three months after he purchased the machine. He has either become fed-up with trying to make all of the software work, or has gotten it to work after many long hours at the machine. He fails to consider how valuable his own time is. The many hours he spent fighting his way up to a productive level overshadow the \$200 to \$300 he "saved" by not investing in the proper support.

No one but the masochist or the unemployed can afford to waste so much valuable, productive time. Proper training and support minimizes this kind of grief and permits the user to rise to an improved level of productivity in a reasonable length of time.

Insisting on this level of support from all segments of the computer industry will hasten its maturity and permit greater personal efficiency.

## PART II

### Consumer Assessment Of Needs

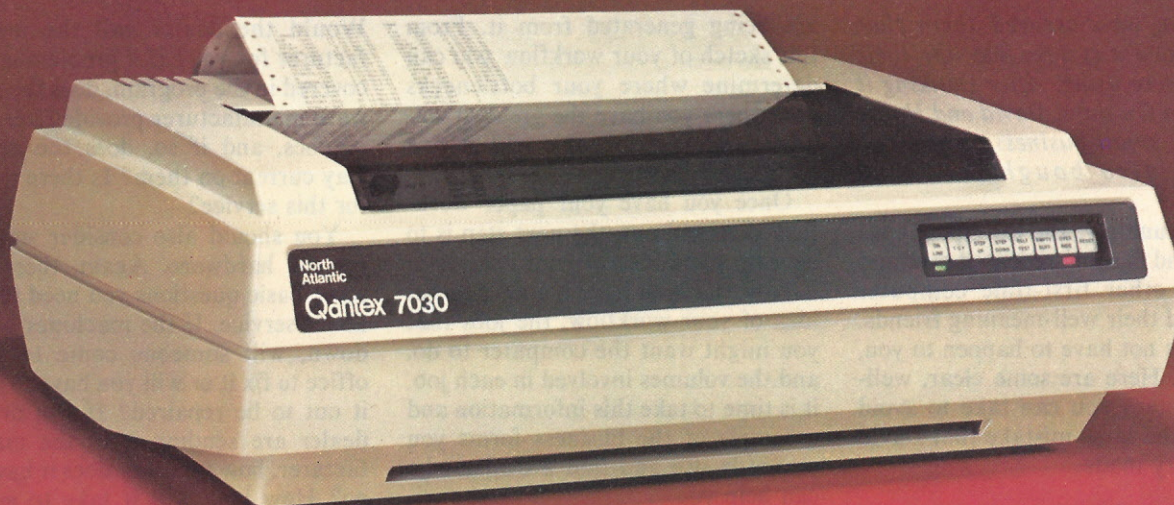
**D**avid and Harry are small builders with no inventory. They need to keep building specifications on file and, from time to time, they must print these specifications with minor revisions. A small word-processing system would have worked just fine for them.

The business next door to David and Harry's business is a plumbing wholesaler with 3000 parts in inventory and over 1000 customers. They are satisfied computer users, and over a period of time, they sold David and Harry on the system they use. David and Harry wanted to make the right decision, however, so they visited a computer store and talked over their purchase with a

Niles McAdams is a free-lance writer from Minnesota who is deeply involved with personal computing.



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***"If you are not flexible enough to adjust to the computer, then you must be willing to pay the price of custom software."***

*salesman, who assured them that they needed a system just like their friends were using. After thinking it over for a few days, David and Harry bought a small-business computer.*

*They also bought a \$5000 mistake.*

Unfortunately, the example above is true and is being repeated over and over by other first-time computer users and their well-meaning friends. This does not have to happen to you, however. Here are some clear, well-defined steps you can take to avoid making the same mistake that David and Harry made.

#### ***Asking questions***

The first question that you need to ask yourself is why you want to buy a computer. David and Harry, for example, have a fascination with technology. In part this led them to buy a machine that was far too powerful for their needs.

A fascination with technology can prevent you from seeing the computer as just another business tool—like a drill press or a new showcase. You should try to separate your personal fascination with the computer from its practical payoffs. No matter how wonderful the machine may be for you and your business, you will be disappointed in it as an investment unless it has some sort of payoff. If you can't look at the computer objectively, then perhaps you should get a good home unit to use until you can look at a business computer strictly as an investment.

Once you have decided that you want to buy a computer, your next task is to decide what jobs you want the computer to do. Before you can do this you need to have a clear picture of what your workflow is now.

To develop this, take a piece of paper and for each job draw a picture of the information flow for that job. This would include where the information comes from, what you do with this information once it is collected, and what sort of reports and output

are being generated from it. From this sketch of your workflow you can determine where your bottlenecks are, where you have the greatest volumes, and which areas would be ripe for mechanization.

Once you have your paper workflow sketched out, the next step is to develop some idea of your volumes.

Now that you have a good general idea of your workflow, the jobs that you might want the computer to do, and the volumes involved in each job, it is time to take this information and a sample of the business forms you presently use and find a dealer who can help you.

#### ***A meaningful relationship***

Unless you are very knowledgeable about computerizing a business, you are going to need help from a dealer. Since this is going to be a relationship that will last anywhere from several weeks to as long as several years, you should find a dealer and a salesman who you can work with and who is willing and able to support you.

Support consists of several factors. The first factor to consider is product selection. The dealer should be selling several different sizes of computers. He should also have a variety of software for sale. This is important because the more variety the dealer has to draw upon, the more likely it is that he will be able to find a software and hardware combination that is right for you.

Dealer support of software is vital because upon first purchasing a computer there is a period of learning to go through. There will be times when you will have trouble understanding a program or making it work the way it should. At this time you need to be able to call either your dealer or salesman to find a solution to your problem.

On the matter of software support, there are some basic questions that you should answer. Does the software manufacturer have toll-free lines for you to use when phoning for help?

Would the dealer call the manufacturer for you? If a problem is discovered in the program, does the software manufacturer provide fixes and patches, and if so, does the dealer stay current on them? Is there a cost for this service?

You should also consider support for the hardware. Again, there are some basic questions you need to ask about service. If the machines break down, will someone come to your office to fix it or will you have to send it out to be repaired? If you or the dealer are sending it to the manufacturer, how far away does it have to go? How long will it take to get it repaired? Are there service contracts available? If it takes a long time, is there some provision for a replacement computer during that period? What about routine maintenance such as head adjustments—are they done at the dealers or are they sent to service centers?

Having answered these questions to your satisfaction, you should sit down with the salesman and go over the work material that you have developed. This would include the workflow charts, the forms you use, and the volume estimates for each job that you wish to computerize. The salesman can use this material to develop an estimate of how large a computer you will need.

#### ***Memory factor***

There will be two factors to consider: the internal and the external memory capacity of the computer. This capacity is measured in "bytes." For all practical purposes, a byte is the same as a keystroke on the computer's keyboard. The letter "A," the number "5," and the character "&" are each considered as one byte by the computer. Even the blank space between words is considered by the computer as one byte.

The internal memory of the computer is called RAM (Random Access Memory). RAM is all electronic and is very fast. The computer



uses RAM as a sort of an electronic scratchpad to carry out its tasks such as computations, comparisons and sorting. RAM is expensive, however, and it isn't necessary to buy more than you need. A small-business computer will have any amount from 16,000 to 128,000 bytes, with 32,000 and 64,000 bytes being typical.

But even a small job can take up all of the internal memory of the computer very quickly. Almost all small-business computers have external memory in the form of disk drives. These are electro-mechanical devices that store data on small 5¼-inch or 8-inch disks coated with a magnetic material. External memory will range from about 90,000 to 10 million bytes, or even higher. Typical configurations for a small-business computer spread from about 200,000 bytes to about 1.5 million bytes.

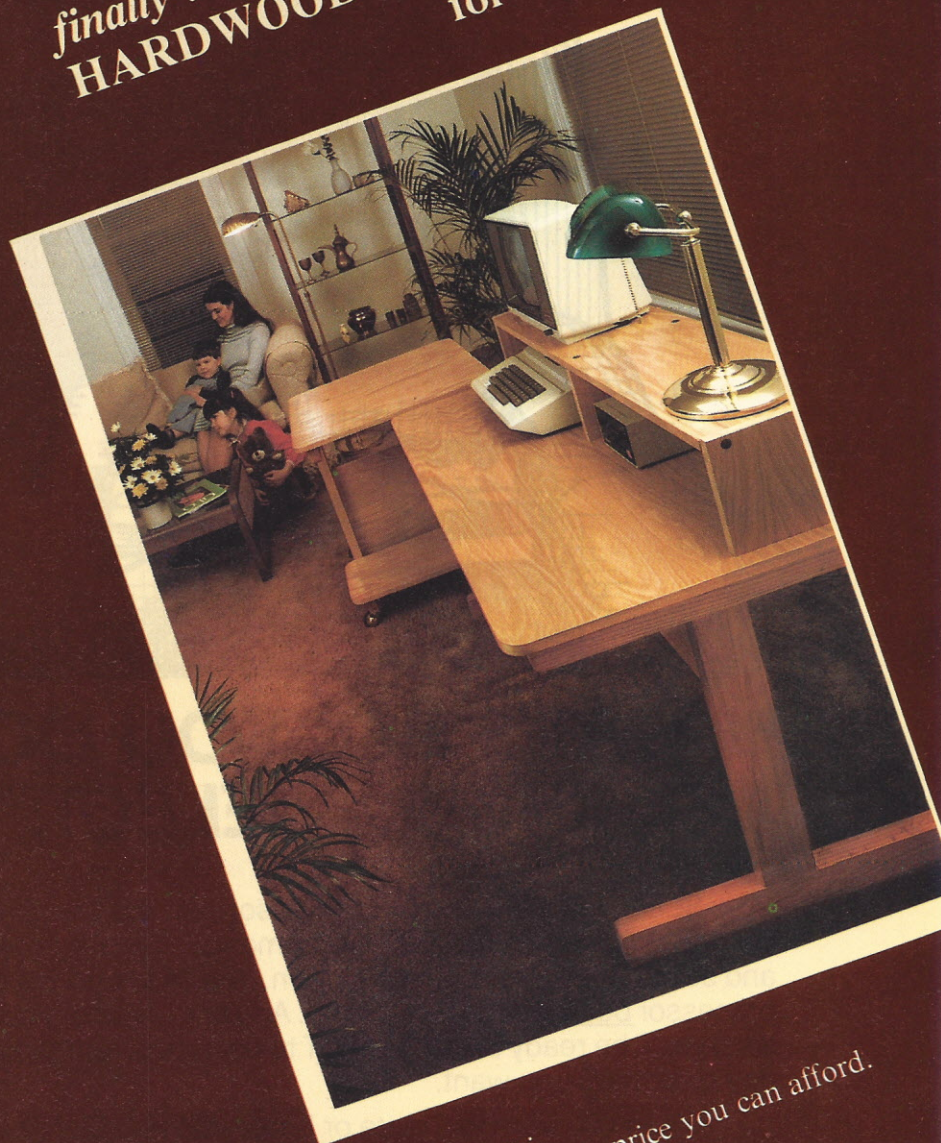
At this point the salesman should go through your workflow graphs and determine how many documents you are producing for a particular application. He should then count how many bytes each document has and multiply the number of bytes in each document by the number of documents to determine the total storage capacity you will need for each application. Then you should discuss software.

### **Software selections**

There are three ways to buy software. I will describe them first and then give you some ways to estimate the costs involved in each of the ways.

The first way is to buy a prewritten or "canned" program. These exist for a wide variety of applications and are preferred if you can find one that even comes close to what you want. Most canned programs are very well thought out and debugged to an extent that is not possible in custom programs. The software programmer can afford to put more time and effort into developing and writing this kind of software because its costs are spread out over hundreds or even

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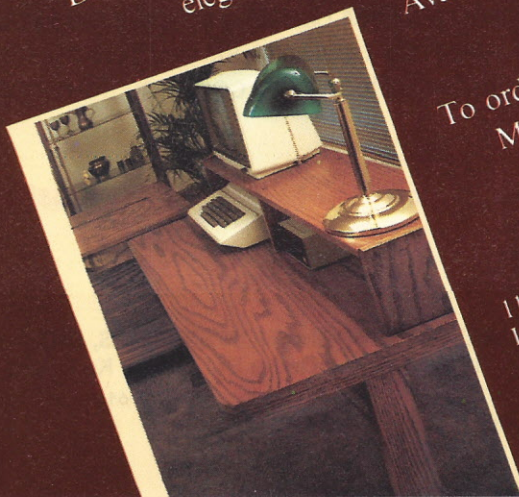
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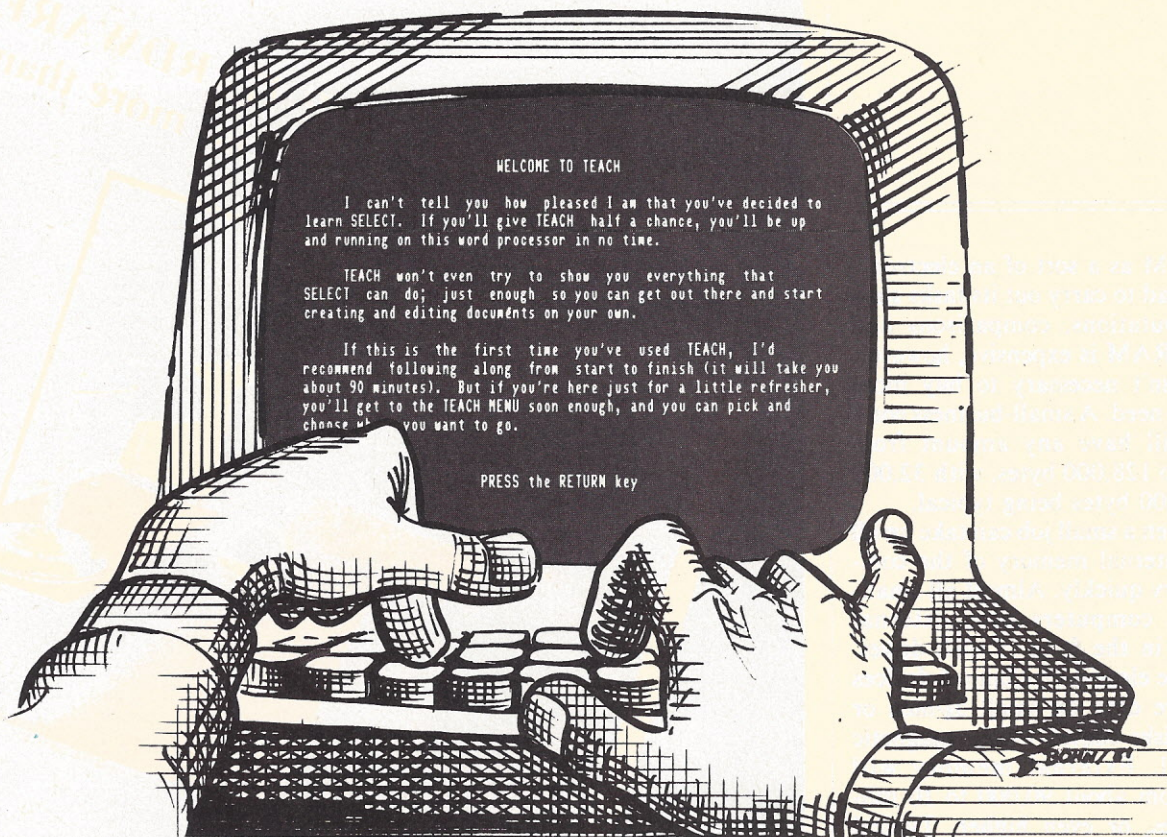
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CIRCLE 62





# TYPE "T" FOR TEACH.<sup>TM</sup>

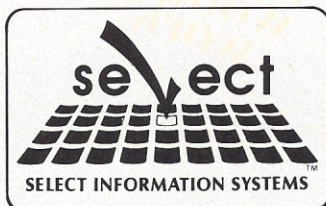


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## COMPUTER CONSIDERATIONS

thousands of customers.

Canned programs are also convenient because software houses offer services that individual programmers cannot afford to provide, such as program updates or fixes for bugs discovered after the program has been released.

At the opposite extreme from buying a canned program is having a program custom written for your needs. If your needs are unique and have not been addressed in a canned program, this could be your only choice. It is not an ideal solution for the first time user, though, and if you decide to go this route, be prepared for some problems.

The first problem will be financial. Programming charges range from \$20 to \$75 per hour and it is not unusual for a program to take several weeks to write. Thus, a custom program can easily run into several thousands of dollars.

By definition custom programs are unique and probably won't have the extensive documentation and debugging that canned programs have. Moreover, if problems develop later in the program, you are unlikely to be able to find the same support that is available with canned programs.

A third approach, a sort of halfway solution, is to have a canned program modified to fit your individual needs. This can allow you some flexibility if you find that you just have to have some feature that is not found in a canned program. If you use someone who is familiar with the particular canned program that you want to modify, then this approach will probably cost less and run less chance of developing programming difficulties that can result from custom programs.

The key to making this approach successful is finding someone who is familiar with the program that is to be modified. If you cannot find someone who is familiar with it, you might consider giving up on this approach because it can take more time to

learn the canned program than it would take to write a custom program from scratch.

### *A few pointers*


Here are a few pointers to keep in mind if you decide to use custom or modified software:

- Make sure that you know exactly what you want. Nothing runs up costs faster than changing your mind about a program after it is already halfway written.
- Have a programmer work on a contract basis both for his protection and yours, and if at all possible, the salary scale should be fixed rather than a per-hour arrangement. Though you may have to make some advance payments, reserve much of the fee until the program is working as was specified when the deal was struck.

It is helpful to have some idea of what your software costs are before a programming project is started. The amount involved will depend on whether you buy canned software, modify a canned program, or have a program custom written.

Canned programs are the cheapest and for business applications range from about \$100 per package to about \$600 per package. Unfortunately, the rule of thumb in software pricing is to charge whatever the traffic will bear. Thus you will see some prices that are as high as \$2000 per package.

Programming fees range from about \$20 per hour to about \$75 dollars per hour. A good programmer should be able to write a custom program for a standard application in 40 to 80 hours. Each application should cost somewhere between \$2000 to \$4000.

If you can find a programmer to modify a canned package, you can add from five to 10 hours of programming time to the cost of the canned program. So if a canned program sells at \$300, you can expect to pay another \$200 to \$400 dollars to have it modified. 

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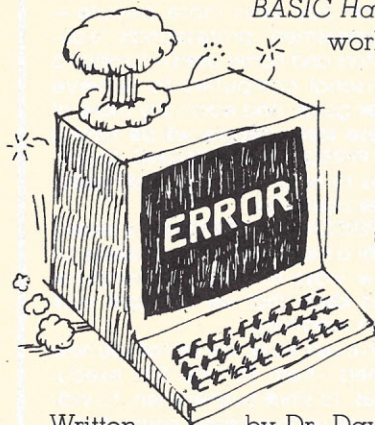
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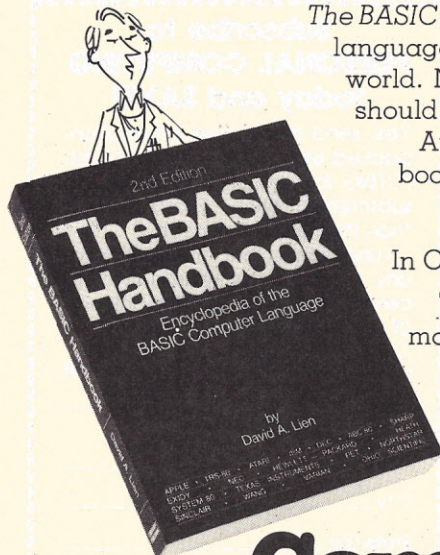
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## ANSWERS

(continued from page 17)

they used the keyboard for a long time.

A last caution—some devices are called ergonomic when they are merely familiar. Thus, some monitors offer black letters on a white screen the size of a piece of paper, and charge the moon and half the sky for it. The user may find out later that such a large expanse of white can create a mind-maddening flicker unless it's done correctly. Even if it doesn't annoy the user, green on white has been proven to work better.

A truly ergonomic keyboard would look like two slanted grapefruit halves covered with funny-shaped keys. And the letters on the keys would match high-usage letters like "a" with the fingers that have the most nerve endings, like the forefingers. They certainly wouldn't be matched with the pinkies, which is what is found on conventional keyboards. Although this would be real ergonomics, few people are willing to retrain lifetime habits to learn how to use such a keyboard. So sometimes the heavy hand of history bears down on the youthful shoulder of ergonomics. When people say "be practical," what they're often invoking isn't functional practicality, but historic necessity.

*Editor's note: See our article "High-End Systems: The Price Of Power" on page 52 for more information on ergonomics.*

**Q:** I don't have an engineering degree. I do compute. Yet I find that I am frequently struggling to understand the jargon. What can I do to make it easier?

**A:** You have a common problem. The reason it's so common is that computer firms are generally run by engineers. Their inventions have the flavor of western civilization, but unfortunately, their language may not. Yet users should not shun products simply because their



makers seem obtuse about user concerns. So you might want to purchase a personal-computer terms dictionary. Sybex's *International Micro-Computer Dictionary* is one such reference tool.

In some ways, engineering terms like RS-232-C, pixel, ASCII and EPROM aren't the ones that are most likely to confuse you. Instead, terms that are applications or alterations of ordinary words, used alone or together, are the ones that cause confusion. These words include: address, architecture, assembly language, backup, board, boot, branch, buffer, clock, compiler, feed, floppy, intelligent, loop and monitor. Other terms are: pipe, port, record, rollover, serial, slice, spool and volume. These seemingly "normal" terms may give you the illusion that you understand what's happening in your system—even though you know you don't.

A few examples won't save you from the dictionary, but they may make understanding seem like a less-than-hopeless task. One example, assembly language, refers to any of a number of programming languages that speak almost directly to the machine. Each term matches with some internal or external action the computer can take. This is easy on the machine, but hard on you. Since computers are so maddeningly literal, assembly-language programming entails a fanatic attention to detail. Few people attempt it until they've become proficient at programming in a high-level language (BASIC, Pascal, FORTRAN, etc.).

Statements in these high-level languages encompass skeins of machine-language instructions, and require a provision for translating into the machine's own language. The reason this is important to non-programmers is that assembly-language and machine-language programs generally take up less space than high-level languages, and run faster. This leaves more room for data in your computer, and the computer takes less time to

carry out your instructions.

Although this is usually true of BASIC, the most familiar personal-computer high-level language, it is usually not true of other high-level languages, like FORTRAN. That's because most BASICs are interpreted languages—they are stored in their source (high-level) form, and the computer decides what each instruction means at run time. Most other high-level languages are compiled—after the program is written, another program called a compiler translates it into machine language, and it is then stored that way. So, the computer can run a machine-language program from then on.

**Q: The switch on my Apple II broke, and I had to have the entire power supply replaced to fix it. This cost a great deal. How do I prevent it from happening in the future?**

**A:** One way is to become an electronics technician. Then you can install a new switch onto the power supply as the occasion demands. Another is to never turn the power off, which is not as crazy as it may seem. Apples used as instrument or home controllers may be run 24 hours a day for years with no ill effects. An Apple's power consumption is fairly small. And the stress—and shortened life—of components being brought up to and down from operating temperature may cost more than leaving the system on.

But Apples often have to be turned on and off to boot or reboot programs. This comes from some Apple software taking possession of the machine's "consciousness," forcing users to actually cut the power to be able to run another program, for example. This can be done by pulling the plug out, which may cause problems for you, especially if the plug is hard to reach. Hardware stores and some electronic supply stores provide a solution for about \$20, in the form of a heavy-duty grounded extension


cord with a resettable circuit breaker. Add-on switches like the Super Fan II from RH Electronics (Buellton, Calif.) also provides a solution, and this device combines a switch, a fan and an accessory plug. Users find that the lighted switch on these devices is actually handier than the one on the backside of the Apple.

**Q: I find most applications software much harder to use than some advertisements claim it to be. It's maddening to have one little mistake cause me to lose hours, or even minutes, of work. What can I do about this?**

**A:** Your fears and frustrations are well-placed. Two things make applications software somewhat difficult to use. One is that software firms sometimes don't understand the mental processes and professional requirements of non-programmers. The second is that the limited power of current personal computers puts sharp boundaries on how helpful and forgiving those computers can be.

But many people do learn to work with applications software. They succeed by building, in their minds, a model of a machine thinking. The machine is logical, speedy, and usually only accepts one way of doing things. Often the first mistake a person makes with a program is omitting a needed space, or a colon in some command. This produces some sort of error message.

You have to determine what you've done wrong. Troubleshooting your own mistakes works best if you can attack them as unemotionally as the machine attacks its tasks. This can be hard if you need a report in an hour and the screen is rippling and the keys don't make anything happen.

But is it worth it? And is it worth learning different styles of orders for different styles of software, as is so often necessary? The answer is yes, if you value your time. 



## LETTERS

### MISSED THE MAILING

(continued from page 7)

of either ZIP codes or last names. In addition, three different sets of selection criteria (date-ranges and categories) may be specified, each of which may print its own brief optional message right onto the label. For example, "Happy New Year," "Time to Renew," or "Complementary Issue" might be printed onto a label depending on which set of criteria it met. Or, any of the normally unprinted information—such as date or categories—could be printed here. Complex printing formats may also be saved on disk and recalled for future use.

Word processor merge capabilities are equally powerful. Sequential files readable by any word processor are easily produced in the same way as a printout. By using the last name, first name, title, and nickname fields in creative combinations, the user can create literally thousands of pseudo-individualized letters.

Paul D. Nadler  
PRESIDENT  
INTEGRON SYSTEMS

### RESTING ON RESEARCH LAURELS

The threat posed by AT&T's imminent entry into the data-processing field is real and worth careful scrutiny.

As you point out in your question and answers column in April, the phone company would also like to be the desk-top workstation company. The frightening thing about AT&T's presence as a personal-computer manufacturer is that its assets are so great that the mere mention of these dollars could scare smaller firms out of the field. Since it is, of course, the smaller firms and start-up entrepreneurs that have provided the most innovative products in the personal-computing market, this would seriously change the face of this business sector. It would be a shame to see personal computing end up as a fight between IBM and AT&T.

Moreover, while AT&T can be one of the more research-conscious firms when its future depends on it, it also can be simply a marketing and advertising conscious firm when it has knocked out most of its competitors. It would be sad to see AT&T shake out a host of personal-computing competitors and then rest on its research laurels.

Here's to continued innovation and excitement in the personal-computing market.

Jack Bruce  
SCARSDALE, NY

### FEEL THE WIND

Your recent article "Seaworthy Computers Make For Smooth Sailing" on page 46 of your April 1982 issue truly hit home. While some navigators back off from using computers on board because they feel it destroys their integrity as boatmen, I have been using one on my small yacht for the past few years.

I have found that my ability as a navigator has not diminished but has actually grown while using the personal computer navigation packages. I am now able to truly gauge my location in the plane of the sea. My own judgments of place are getting keener because I have an accurate reference point—the personal computer's results—to test my own guesses against.

In addition, while the computer has taken away some of my tasks as a navigator, it has also offered me more leisure time. I am finally able to sit back, relax and smell the ocean, feel the wind, and slip with the tide instead of constantly watching my maps for buoys and landmarks that never seem to come when you need them.

The personal computer has become almost like a second mate to me on board and it is nearly indispensable.

Bill Bauer  
SANTA MONICA, CA

### GOOD TIMING

The article on graphics presentation on page 34 of your February 1982 issue was well-timed. Most managers could be making good use of graphics right now, and the article goes a long way toward educating them. Many thanks to Ken McLamb for his insight.

You mentioned several suppliers of graphics software and hardware; always a valuable service to your readers. However, you neglected to mention the source of the color-graphics artwork at the beginning of the article.

The computer is an Intelligent Systems 8300I, and all three close-ups are unretouched photographs of its screen. The 8300I is one of the lowest-priced units available anywhere today. It is produced by Intelligent Systems Corp., Intecolor

Dr., 225 Technology Park/Atlanta, GA 30092.

Thanks again for an interesting article.  
Susan Sheridan  
MARKETING COMMUNICATIONS MANAGER

### A DIFFERENT KIND OF MANAGEMENT

In your article on applications of personal computers in weather forecasting ("A Window on the Weather," page 49, February 1982) you discussed the test program that was conducted in California to improve smoke management during rice straw burning.

Besides accessing local meteorological data from Nowcasting (not Narrowcasting as was mentioned in the article), Apple computers also accessed hourly air pollution measurements from the California Air Resources Board's state computer. The third important factor in the test program was the management of information on approximately 500,000 acres of rice fields in the Sacramento Valley.

The program tasks required timely data access, capability of storing large volumes of data, and updating meteorological, air quality, and acreage information daily. This information was then used in a computerized distribution formula. The Apple computers were indispensable in getting the work done, and helped make the program a success.

One correction: the original idea and design of the research program was conceived and promoted by the consulting firm of Fife Environmental.

Les Fife  
FIFE ENVIRONMENTAL  
FAIR OAKS, CA

### MODEST MONEY FOR MAGIC

I was very interested in the article on word processing software (page 72, March 1982) but cannot understand why the article omitted the Magic Window by Artsci.

This system is modestly priced yet contains most, if not all of the features of other sophisticated, but more expensive systems. Moreover, it simulates a standard typewriter, which allows you to actually see your sheet of paper move across the screen as you type. What you see is actually printed out.

N. David Fay  
ORANGE PARK, FL



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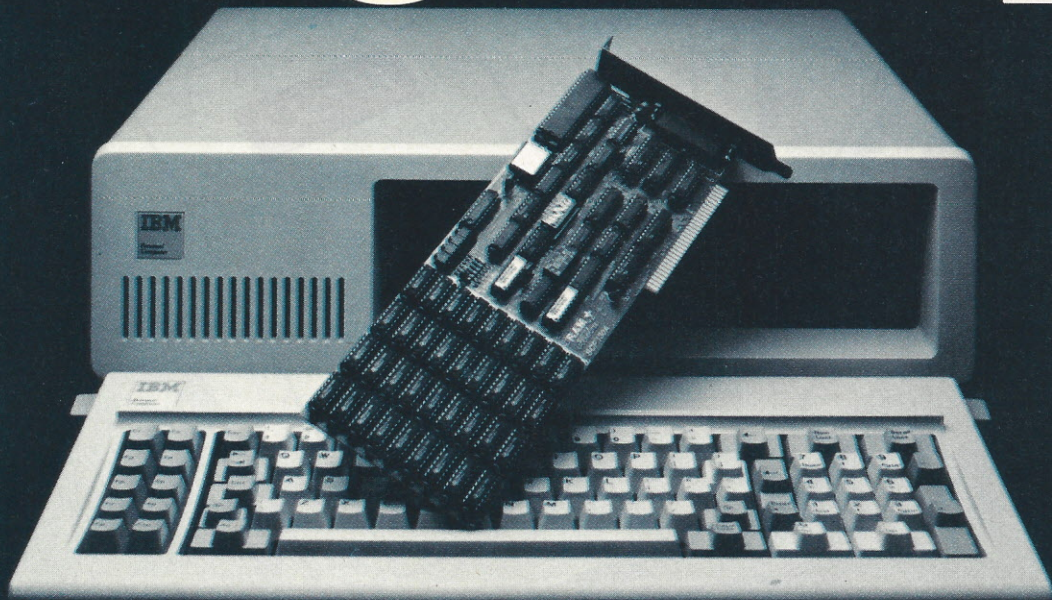
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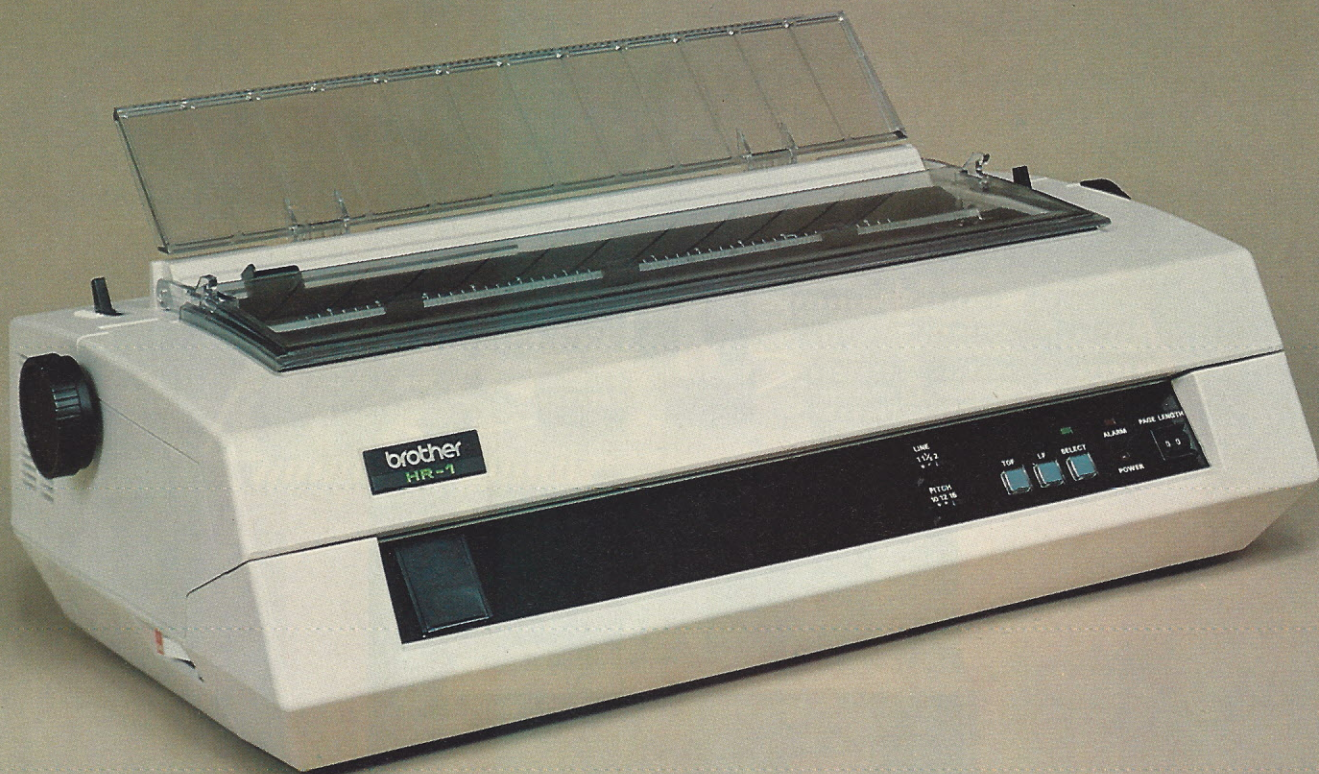
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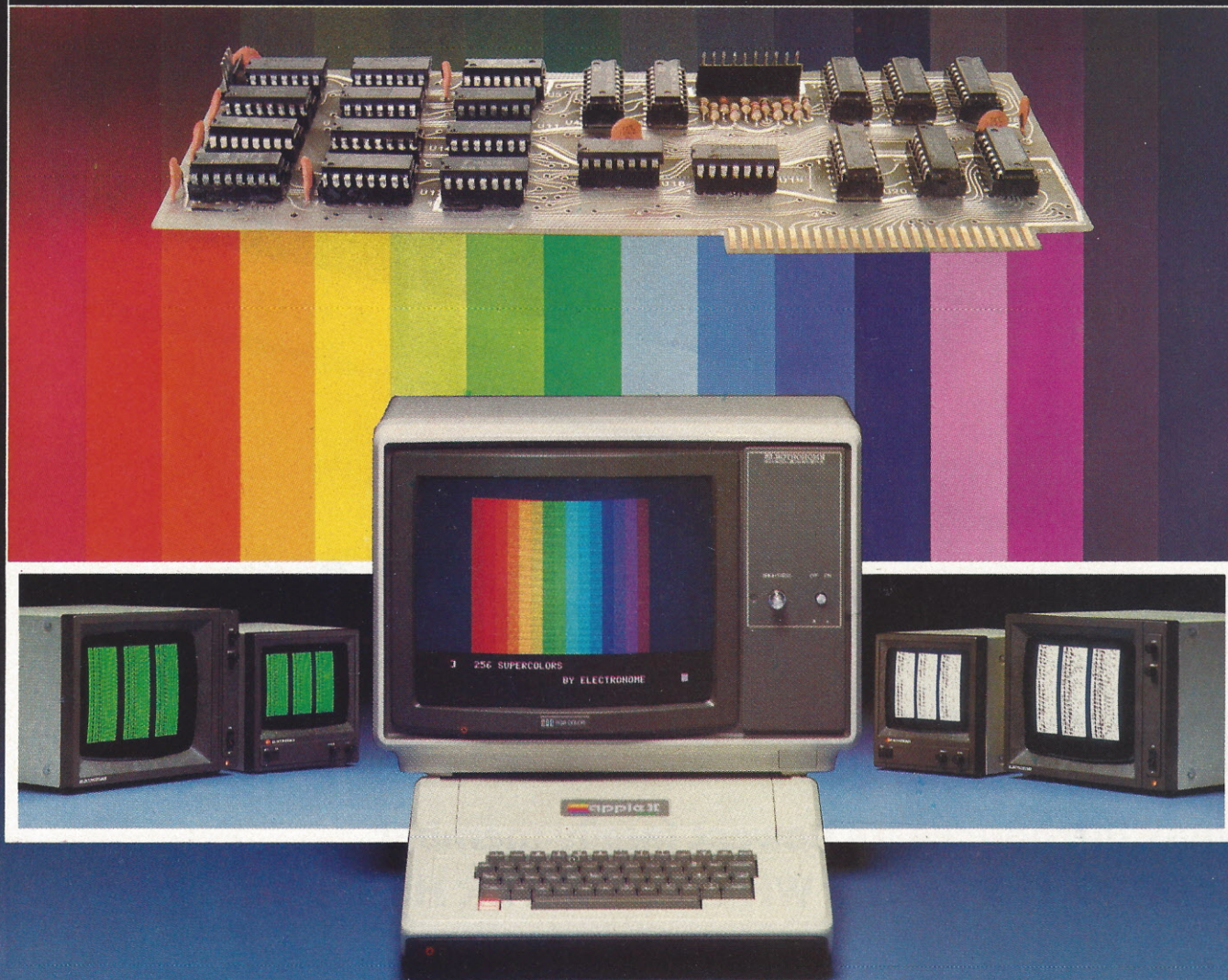
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## Signifying What Computing Really Means

### How much ego is tied in to your system?

#### COMPUTER CHOICES: BEWARE OF CONSPICUOUS COMPUTING

H. DOMINIC COVVEY AND  
NEIL H. MCALISTER  
ADDISON-WESLEY PUBLISHING CO.  
225 pp., \$8.95

**W**ould more personal computers be sold if they had racing stripes? After all, stripes don't mean anything—unless they signify a sergeant or a ship's captain. And just as Detroit sells embellished cars (or did sell them) to drivers interested in enhancing their image, Dr. Neil McAlister and Dominic Covvey maintain, in *Computer Choices*, that too many people purchase personal computers for the wrong reasons: "The price, economy and real necessity of a computer system seldom figure in the sell. There is subtle emphasis not on what the computer can do for you, the user, but on what it can do for your image."

The authors call this "conspicuous computing," and define it as "an irrational lust for the aura of sophistication and progress that a person, department or institution can acquire by becoming 'computerized.'" Although at first glance this may sound like an anti-computer statement, the book's authors are far from being anti-computerists. McAlister is a physician and Covvey is Director of Cardiovascular Computing at Toronto General Hospital, and they are recognized experts in medical technology. They are also the authors of three other books on computers.

In *Computer Choices*, the authors point out that Madison Avenue has

invaded the computer industry. "Colors are picked with care, while boxes housing micro-chips are larger than necessary because big is impressive," they write. "The product will be presented as something by which you may acquire characteristics that you would not otherwise possess. The pitch to your ego can be irresistible as common experience proves."

In addition to more of this indepth analysis of all aspects of conspicuous computing, the authors examine many other areas of computing such as consumer education, the reasons for buying personal computers, security, software, and human engineering and management issues. McAlister and Covvey state that successful computer applications just don't happen. "They are made, and mere technical know-how is not enough to ensure success. Knowledge of the issue involved in computing is essential to achieving worthwhile results."

One of the most interesting chapters in *Computer Choices* is "Tales of Horror," which describes several true stories designed to "make your hair stand on end and your blood run like icewater through your veins." In one such story, the authors discuss how a fire in their hospital's computer center taught them a vital lesson in computer security and fire prevention.

*Computer Choices* also includes an excellent discussion of the economics of cost justification for computers. In this discussion, McAlister and Covvey describe several methods for computing the real costs and potential benefits of a new system. They maintain that one of the first steps is to think of all the costs because, for disaster to strike, "all one needs to do is overlook some of the costs—not so

much from malevolent intentions as from simple ignorance of all the costs of a process involving a computer." Moreover, they point out that: "Nothing can be said to be 'cost justified' unless it surpasses predefined thresholds in terms of cost-benefit and/or cost-effective analysis, or unless in some other way it passes a test that permits the value received for the money invested to be evaluated."

*Computer Choices* is one of the few books about personal computing that is written with warmth and humor. It even contains several delightful cartoons that help readers understand valid points. McAlister and Covvey are to be commended for writing an informative, factual and thought-provoking book.

### Guides to cure buying decision blues

#### USING MICROCOMPUTERS IN BUSINESS: A GUIDE FOR THE PERPLEXED

STANLEY VEIT  
HAYDEN BOOK COMPANY  
142 pp., \$9.95

#### WEBSTER'S MICROCOMPUTER BUYER'S GUIDE

TONY WEBSTER  
HAYDEN BOOK COMPANY  
326 pp., \$25

**T**wo books, *Using Microcomputers in Business: A Guide for the Perplexed* and *Webster's Microcomputer Buyer's Guide*, enable both the novice and the computer professional to choose the right system for their specific needs. While Stanley Veit's *Using Micro-*



*Computers in Business* is a computer primer to a degree, it still offers many practical and timely recommendations that will interest even the seasoned pro. On the other hand, *Webster's Microcomputer Buyer's Guide* is filled with the detailed facts and figures that are necessary to fully evaluate alternative hardware, software and peripheral systems.

In summing up the arguments for word-processing systems, Tony Webster says, "Secretarial salaries have spiralled upwards in the 70s by as much as 300 percent," while capital investment per office worker is only \$2000 as compared to over \$20,000 for each factory worker. Furthermore, Webster notes, when one considers all of the drafts and revisions necessary to produce one final typewritten page, even the most experienced typist's average typing speed drops to a mere four to 12 words per minute. To add insult to injury, Veit says that "even a two-fingered typist can type much faster on a word processor than an experienced typist can on a regular typewriter."

The difference between these two books is that *Using Microcomputers in Business* tells the readers the hows and whys, while *Webster's Buying Guide* explains the whats, ifs, ands and buts. For example, in discussing the purchase of a personal computer system, Veit cautions buyers to ignore manufacturers' labels and the reputations of companies built on a different class of machine. "They should try to judge what is offered on the basis of problem solution and equipment support as well as price."

In addition to its comprehensive catalog of the latest hardware and software, *Webster's Buying Guide* includes a special section evaluating the present personal-computer market and projecting future trends. On pricing personal computers, Webster predicts that they will not go the way of the calculator because: "A major portion of system cost is in periph-

erals, such as disk-storage drives and printers. Peripherals are expected to increase in power for the same price, not decrease in cost for the same power. The other reason prices are not expected to decrease is because software development and support prices, mostly labor, will increase over time."

*Webster's Microcomputer Buyer's Guide* covers the entire range of personal computers, hardware, software and peripherals from Apples, TRS-80s and PETs to the more elaborate and expensive Data General microNova series. Each personal-computer model is individually described in a two- to six-page section, which includes an indepth overview of its capabilities, central-processing system, peripherals, software, price, and the name and address of the manufacturer's home office.

But before buying any personal computer hardware or software, users should thoroughly study *Webster's Buyer's Guide*, for it will save not only time and money, but perhaps even some aggravation because readers will be fully informed before they buy.

## On losing neither dignity nor destiny control

### BLAMING TECHNOLOGY— THE IRRATIONAL SEARCH

SAMUEL C. FLORMAN  
ST. MARTIN'S PRESS  
207 pp., \$12.95

The Luddites, those early 19th century workmen who protested technology, are no longer smashing sewing machines in England. But their modern counterparts are successfully protesting and blocking construction of nuclear power plants in America and elsewhere. In *Blaming Technology*, Samuel Florman presents a hard-hitting examination

of the complex forces causing the rise of anti-technologists, the people who favor environmentalism and over-regulation.

An engineer by training and author of the highly praised *The Existential Pleasures of Engineering*, Florman maintains it "is not technology, but the fear of technology" that is running rampant. The question then becomes, why now? Why in the highly developed West which has benefited most from all areas of technology? After all, technology has given us the Salk and Sabine polio vaccines, life-saving satellite weather photographs, men walking on the moon, machines sent far into space, and personal computers. Yet technology critics say it has also given us Three Mile Island, oil spills and other environmental disasters.

In *Blaming Technology*, Florman emphasizes: "If the nation has become more sensitive to environmental considerations, then so, by definition, has the engineer. Engineering is not anti-environment. Environmentalism itself is a branch of engineering."

The book is a series of literate, thought-provoking essays, and these essays cover a broad range of issues from nuclear power to the demise of fluidic circuits (devices that depend on the pressure and flow of fluid in precisely shaped channels for their operation), to why more women do not go into engineering, to the myth that small is beautiful.

Florman writes with precision and controlled anger against those people who seek to stifle technology. He says that the anti-technologists are misguided, and that one of America's main problems is that the people are "overlegislated and undermanned, overwritten and underaccomplished." Of the country itself, he says: "It is overlawyered and underengineered."

*Blaming Technology—The Irrational Search for Scapegoats* is a timely and relevant book which



## BOOK REVIEWS

should be mandatory reading for all engineers, business leaders and concerned citizens. In the final analysis Florman reminds us, and especially the antitechnologists, that: "We have created a high technology, and at the same time created the glories of high civilization. In doing so, we have lost neither our dignity nor control of our own destiny—in fact we have gained more dignity and more control of our destinies."

### For those techies in the house

#### PERSONAL COMPUTING: HOME, PROFESSIONAL AND SMALL BUSINESS APPLICATIONS

DANIEL MCGLYNN  
JOHN WILEY & SONS  
448 pp., \$14.95

**F**or the new personal-computer user, Daniel McGlynn's book will be a welcome addition to his library. It describes the main parts of a computer, including hardware, software and peripheral devices, and describes exactly what they do and how they work. In short, McGlynn has written a comprehensive primer on all areas of personal computers.

Experienced computer users may find that the book reads like a Ph.D. thesis, and contains too many detailed facts. McGlynn provides too much information in too many long-winded, complex paragraphs that need some good red-pencil editing to refine and focus his points.

But the book raises many questions that should be asked before any computer system is purchased. The author says that computers, like buildings, each have their own individual architecture and that no one system is "intrinsically better than another." Rather, McGlynn says that the potential buyer should "attempt to appreciate each architecture for what it

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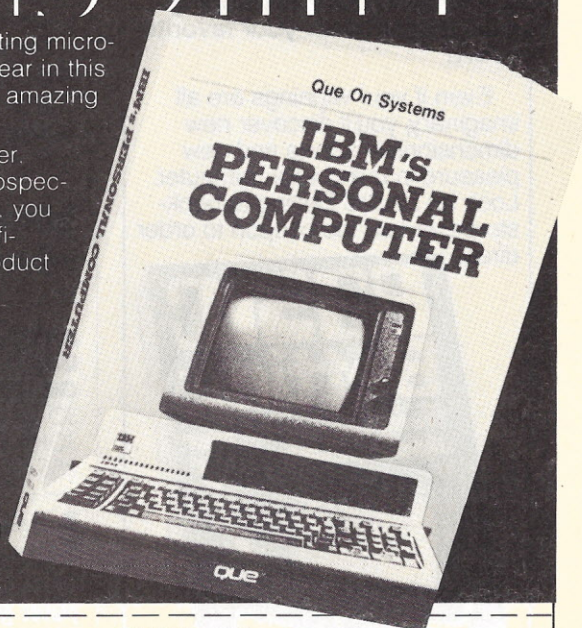
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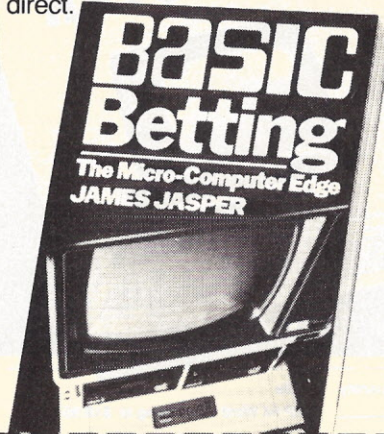
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## BOOK REVIEWS

is, and determine which applications such architecture would be most suited for."

McGlynn also makes an astute observation about the role of computer stores in meeting the needs of their customers. He emphasizes that computer stores are in the business of selling hardware and not solutions. "The people who sell solutions are the computer-systems houses and OEMs." Therefore, it is this search for "solutions" that has encouraged the development of new software such as VisiCalc. As the author maintains: "Users are interested in solutions to specific problems, not developing such solutions themselves."

For many computer users, Daniel McGlynn's *Personal Computing 2nd Edition* will be a good place to start finding some of these solutions.

## What do you look for when you want to look?

### INTRODUCTION TO INTERACTIVE COMPUTER GRAPHICS

JOAN E. SCOTT  
JOHN WILEY & SONS  
255 pp., \$24.95

*Introduction to Interactive Computer Graphics* is an indepth "how-to" book on all areas of computer graphics. Joan Scott, who is the president of her own Houston-based computer consulting firm, has written a thorough, easy-to-understand guide that will interest not only designers, but managers, programmers, and anyone who uses or plans to use computer graphics.

The book begins with an extensive description of the hardware and software required for interactive computer graphics. This equipment includes light pens, digitizers, voice data-entry systems, stroke-writing screens, refreshed displays, raster screens, plasma displays and various types of plot-

ters. Moreover, Scott explains the advantages and disadvantages of each requirement, and includes simple block diagrams of how each works.

According to Scott, a system cannot be considered interactive "unless it responds to the operator's actions with immediate visual feedback." However, in describing the ideal interactive graphic system, she writes: "It must be simple and direct, relying on visual interaction as much as possible to promote a sense of naturalness in man/machine dialogue."

In *Introduction to Interactive Computer Graphics*, the author points out one of the main advantages of interactive graphic systems for architects, designers and other people who use CAD/CAM applications: "Computer drawings have a uniformly neat and precise appearance, regardless of the individual style of the designer. Faults that might be overlooked on a typical hand-done drawing are exaggerated by the exactness of the computer plot. Designers at drafting boards cannot afford to devote an excessive amount of time to making every drawing beautiful, but the computer-assisted designer has the means at his disposal to easily work on every assignment."

Another feature of this book is its detailed 32-point System Capability Checklist. Although Scott designed this list primarily for use with interactive graphic systems, many of her points are valuable to users of all types of computer systems—including personal computers. Among the most important points are "Simplicity of operation," which means that the normal user should be able to accomplish "all routine functions without the assistance of trained personnel"; and "Upward compatibility," which means that "any future changes in hardware or software must not interfere with the system's ability to deal with existing drawings."

In summarizing the benefits of in-



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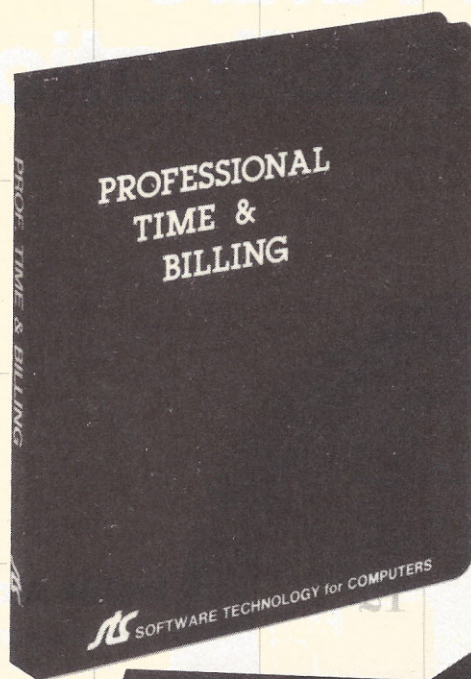
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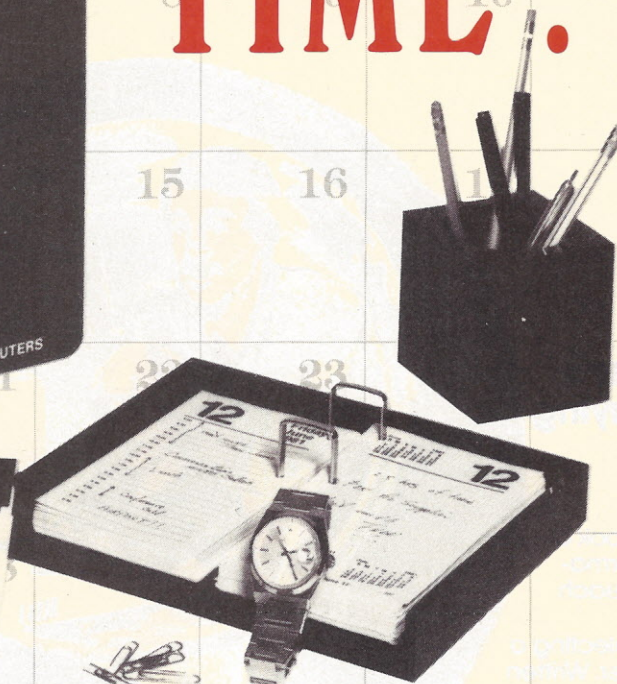


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## BOOK REVIEWS

teractive computer-graphic systems, Scott notes that inflation makes such systems an attractive investment since: "most of the expense is incurred at the beginning for equipment testing and training, while most savings occur later on and continue indefinitely in the form of reduced labor requirements to produce the same work. In an inflationary economy, this is an ideal situation."

### Real cosmic communication refers to more than just a Timothy Leary illusion

#### TELEMATIC SOCIETY: A CHALLENGE FOR TOMORROW

JAMES MARTIN  
PRENTICE-HALL  
244 pp., \$12.95

#### THE INFORMATION SOCIETY AS POST-INDUSTRIAL SOCIETY

YONEJI MASUDA  
WORLD FUTURE SOCIETY  
171 pp., \$12.50

People's attitudes have changed from a fear of computers to one of acceptance—and perhaps even kinship—according to James Martin in *Telematic Society*. He writes of a recent hospital program in Scotland in which patients used simple computer terminals that had been programmed to diagnose minor stomach problems. Martin said that the patients described the computers as "friendly, polite and understanding." In some cases it was even difficult to persuade older patients to leave the terminals because "nobody had taken that much interest in those patients in years, and other patients expressed a strong preference for the terminal over communicating with a live person."

When read together, Martin's *Telematic Society* and Yoneji

Masuda's *The Information Society* present an intriguing look into the future of telecommunications and computers from two slightly different perspectives. Martin concentrates on the nuts, bolts and hardware of telecommunications, stressing cable television and satellites, while Masuda describes a plan for a new "information society"; that is, "a 'Computopia' or computer utopia—an ideal global society in which multicentered, multilayered voluntary communities of citizens, participating voluntarily in shared goals and ideas, flourish simultaneously throughout the world."

In discussing his Computopia, Masuda describes the new town of

Higashi-Ikoma in Japan, which is involved in a pilot project using the latest in computer and telecommunications technologies. Masuda says the town makes use of three main telecommunications systems including: "the world's first optical-fiber communications network, which will theoretically allow users to receive 30 television channels and calls from 1000 telephone lines at the same time; it permits two-way multiplex communication by visual, audio and digital methods; and it is a completely wired city, using only one community antenna for its outside television and telecommunications requirements."

Likewise in *Telematic Society*,

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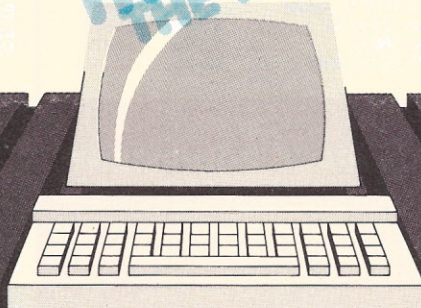
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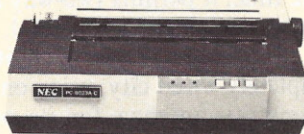
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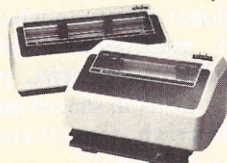
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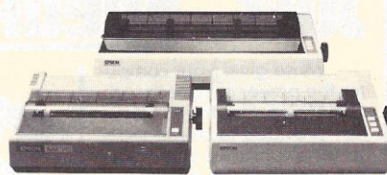
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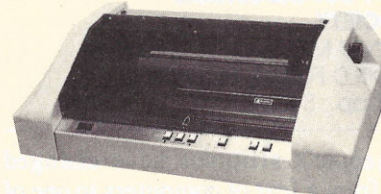
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## BOOK REVIEWS

James Martin describes the limitless possibilities that will be available with advanced telecommunication and computer technologies. He writes of James Bond-type devices such as digital watches that will be able to monitor stock prices—or anything else—in real time, sophisticated paging systems that could page a person anywhere in the country, uses for multichannel cable-television systems and electronic fund transfers. He writes: "If money is information, then that information can reside in computer storage, and payments can consist of data transfers between one machine and another." However, Martin adds, "In reality society will neither be cashless, nor checkless for the foreseeable future."

Another point on which both books agree is that advanced computer and telecommunications technologies will not cause unemployment, but will expand employment and cause new growth industries. Masuda calls these "knowledge industries" and predicts that within 20 to 30 years it will be possible to build a completely automated manufacturing plant that will require "no manual labor."

Martin says that given the right telecommunications links, any white-collar work could be done at home, and that these new technologies "will create such a vast and rich array of products that whole new industries will be needed. These new industries are limited mainly by a shortage of trained people."

While much of what Martin and Masuda discuss in these two books reads like science fiction, most of it is available with today's computer and telecommunications technologies. Both authors say that the primary barriers are not technical, but political, legal, social, economic (Who pays for it?) and the lack of a willingness to do it. As Norman Cousins once said: "The message from the moon is that no problem need any longer be considered insoluble." 

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## POLICING THE PENINSULA

(continued from page 24)

computer designed for that purpose, both decided to buy Apple II's.

Besides doing searches for the officers, Franks felt that the program had to be easy enough to learn and use that even the most computer-reluctant policeman would take to it. It had to take no more than 15 to 20 minutes to learn, with all the cues on the screen (no documentation needed). Six months and 143 modifications later, they had it.

"An officer can walk in here, initialize a disk (that's in their program, too), enter new fields, and make his own enter-and-retrieve program," Frank says. "But it does more. I'm an administrator, so I need alphabetizing and printing, and statistical surveys comparing the information. So each disk has a capture section for officers and an edit section for administrators; both are screen-prompted."

Franks brought his Apple and some games into the station and let the troops play for a month. They found that it didn't blow up in their faces and they couldn't damage it. Once they were comfortable with the system, he added the working program. Now it has 100 percent acceptance at the station.

Franks then received a grant from Apple Computer and D.C. Hayes supplied modems. "Every single department that has seen this system has purchased an Apple and program," Franks says. He has also received calls from police in Montana, the Philippines, Kuwait, and from his "next-door neighbor," Sunnyvale, Calif.

The Sunnyvale police became interested in the system when they were confronted with a big problem. A rapist had attacked 15 women. The assailant had been very careful to leave no clues, and never let his victims see him. According to Andy Pate, "We had 115 suspects. Our notes were filling up file-card boxes. We couldn't collate them all by hand."

At the same time, Sunnyvale detectives had visited the East Palo Alto Substation on a murder investigation where they saw the computer in action. Pate says, "I went to see it and just about fell out of my chair. I had to have it." Pate became active in promoting it with other departments, and formed an officers' users group with Franks.

The hunt for the rapist had the whole community in a turmoil. "Our police division commander mentioned to mayor Diane McKenna that we had this problem, and needed an Apple to work on it." McKenna's husband, Regis, is the head of Apple's public relations agency and she had her own personal computer at home. "The mayor loaned her computer to the police department and right now it's over at the emergency preparedness coordinator's office, organizing resource lists.

"She [the mayor] said we could keep it longer, even

though we had caught the rapist," Pate says. (The rapist had been turned in by a neighbor—no help from the computer.) It's helped solve plenty of other cases, though, including two armed robberies and a counterfeit money ring.

The longest computer searches take 2½ minutes to go through 1000 records. Pate says the biggest problem his department has is the computer's versatility. "We have so many applications for it we have to make sure we slow down and organize the paper flow."

As the use of ISCARS spreads rapidly on the San Francisco peninsula, it will be more able to attack the "commuter-criminal" problem. Pate says, "A disturbing trend that appears in a number of felony categories is people coming from non-local areas to commit crimes. A few years ago, the typical armed robber was a local boy. Now he comes here from depressed areas up to 40 miles away.

"We hope this shared data-base system (using the D.C. Hayes modems and Corvus hard disks) will solve commuter criminal cases. The system allows legal ways to keep track of criminals, their descriptions, automobiles with which they're associated, their known associates, and offers a search method using pattern recognition."

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The Comp-U-Star data base, developed specifically for Source subscribers, allows shoppers to select from over 30,000 brand-name items, and order them directly using a personal computer, a data terminal, or a communicating word processor. Prices are often 40 percent less than suggested retail prices.

Nearly 200 manufacturers from A (Amana) to Z (Zenith) are represented on Comp-U-Star, and offer such items as cameras, major appliances, stereos and televisions. Subscribers can also use the service to do comparison shopping. They are automatically prompted by the system to specify the manufacturer and give some product characteristics. Comp-U-Star then uses that information to scan for product availability and the best price (including delivery costs) among its hundreds of participating dealers.

(continued on page 152)



# Lack of ZX81 memory giving you headaches..?



## The Memotech 64K Memopak

The growth of interest in computer use caused by the introduction of the Sinclair ZX81 has made new and exciting demands on the ingenuity of electronic engineers. At Memotech we have focused our attention on the design of an inexpensive, reliable memory extension.

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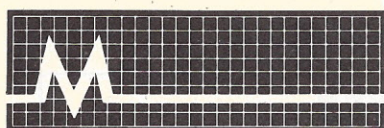
8-16K...This section of memory switches in or out in 4K blocks to leave space for memory mapping, holds its contents during cassette loads, allows communication between programmes, and can be used to run assembly language routines.

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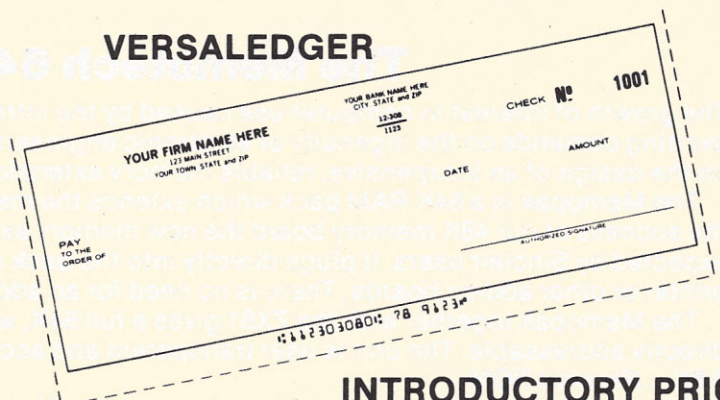
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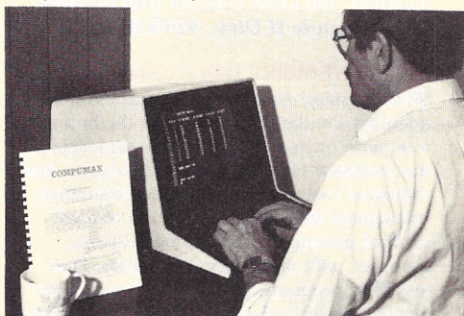
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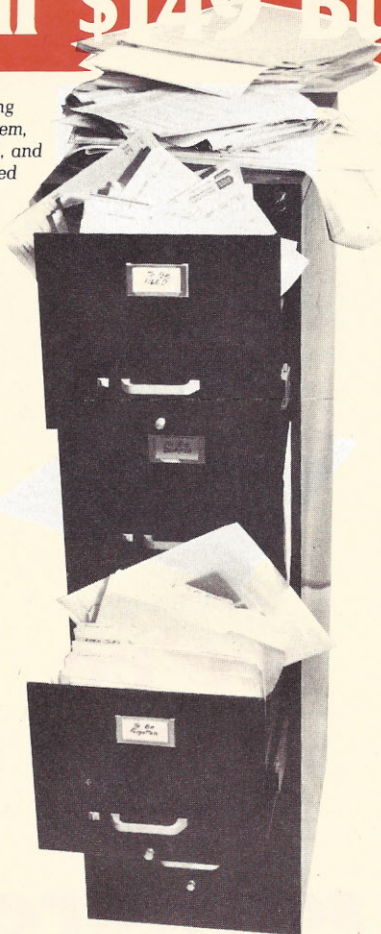
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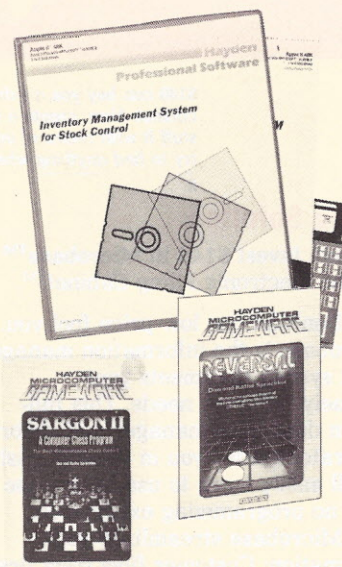
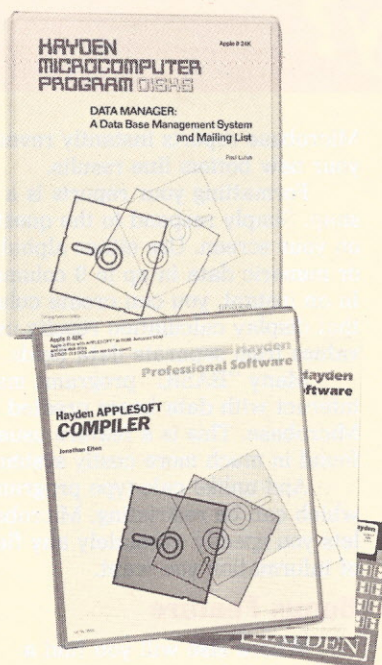
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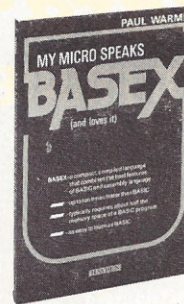
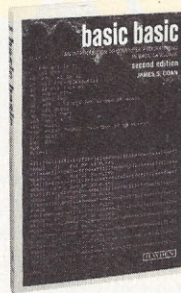
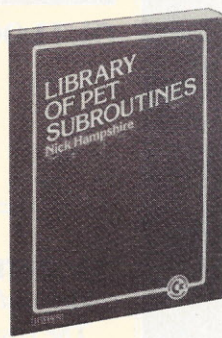
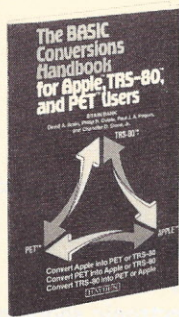
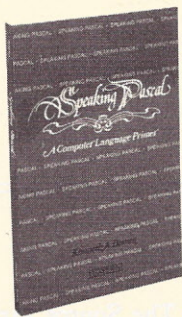
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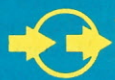
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CIRCLE 82

## OUTLOOK

### COMPUTER SHOPPING

(continued from page 146)

The cost of electronic shopping on The Source varies according to the time of day. A typical search and order requires three to eight minutes, depending on how much information the shopper can give about the item. Prices per-minute for using the service are 50 cents weekdays, 25 cents during the evenings and on weekends, and 17 cents after midnight.

Comp-U-Star is a product of Comp-U-Card of America, Inc., based in Stamford, Conn. Formed as a toll-free shopping service in 1973, the company has over two million members.

The Source now serves over 14,000 individuals, and can be accessed by a local telephone call from over 360 major metropolitan areas. Hourly costs for standard services are \$18 weekdays, \$5.75 evenings and weekends, and \$4.25 after midnight.

For further information about The Source, interested readers can call the data base toll-free at (800) 336-3366.

### LANDLORD PLOWS THROUGH RESERVATIONS AVALANCHE

**A**fter nearly renting his Mommoth, Calif., condominium to two skiing parties for the same weekend, Terry Battelle realized that his reservation system needed some organization. "When you've got several people calling for reservations at once, the odds of making an embarrassing mistake are high," says Battelle, a ski enthusiast who, with his two partners, rents his condominium whenever it's unoccupied. "When your filing system consists of a lot of paper stuffed into a box, the odds of making a mistake are even higher."

Battelle's new reservation system has virtually eliminated the possibility of double bookings. He uses an Apple II personal computer with PFS (Personal Filing System) and PFS: REPORT programs from Software Publishing in Mountain View, Calif.

With PFS Battelle designed his own reservation form, and created a computerized reservation file containing the tenant's name, address and phone number; the number in the party; the date and time for check in and check out; and the total charges broken down into categories. "When someone calls to make a reservation," he says, "I just type all the information into the computer and it's automatically stored."

Battelle then sorts the information and has duplicate forms printed for the tenant, his partners, his cleaning service and his own records.

### WRITING IN A NOVEL WAY

**T**hough personal computers have been quickly embraced by newspapers, businesses, and other non-fiction writers, their entry into the world of "creative"



writers has for the most part been met with suspicion. For many writers, creativity and computers just don't mix.

But at least one novelist, Carole Nelson Douglas, feels that her colleagues who shun the personal computer are not only missing out on a powerful tool to support their creativity, but are also going to have a difficult time surviving financially in the years to come.

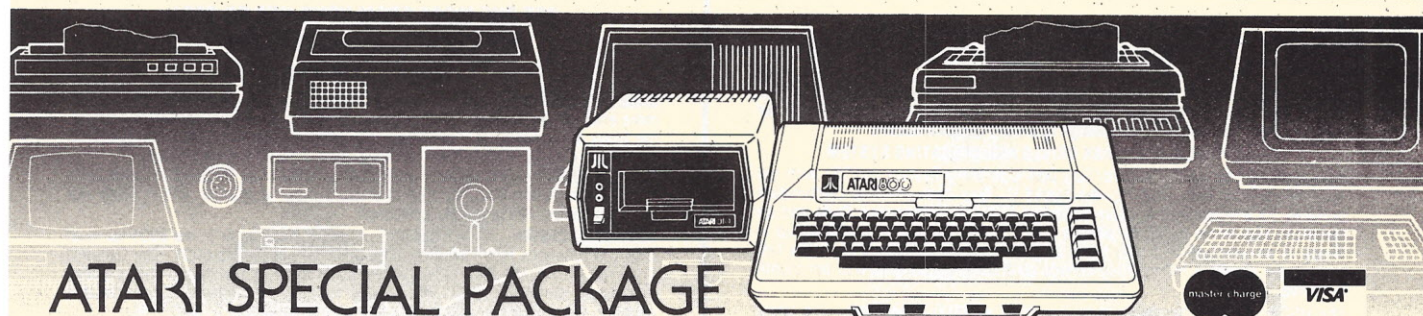
Douglas, author of *Amberleigh*, *Fair Wind*, *Fiery Star*, and two novels that will be published in 1982, works by day as a feature writer and part-time editor for the St. Paul Pioneer Press in St. Paul, Minn., and by night as a novelist. She currently has 10 projects in the works, including a contracted book with the working title "Liberated Lady"—perhaps an apt phrase for her own new-found freedom. Douglas writes her books with the help of an Apple II computer and EasyWriter, a sophisticated word-processing program from Information Unlimited Software in Berkeley, Calif.

"The Apple/EasyWriter combination has eliminated

the drudgery associated with editing and re-typing my manuscripts," says Douglas, "and allows me to spend more of my time actually developing and refining plots and characters. What's more, the computer remembers everything I put into it, so I can start new projects as they arise in my mind and return to them later when I have more time—all without having to keep track of messy manuscript pages and numerous hard-to-decipher note pads. The end result is both increased efficiency and increased artistic freedom."

Douglas first learned about the benefits of a personal computer at the American Booksellers Convention in June 1980, where she met Robert Perry, author of *Owning Your Own Home Computer*.

"Though I knew from my experience at the newspaper how helpful a computer with word processing could be," says Douglas, "I had always thought it would be too expensive to get my own home system. Perry convinced me that this was not true, and got me started looking in



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## OUTLOOK

the right direction. Since I had a big editing job in front of me, I decided to take the plunge and get my own system."

Douglas finally settled on an Apple II with two floppy disk drives for text storage, a Leedex 12-inch monitor, and a Xerox 1750 letter-quality printer. The system cost approximately \$6500.

"Unfortunately, the first word-processing program that I got for the system wasn't very flexible and could not take full advantage of the many capabilities of the monitor and printer," says Douglas. "So I started looking at other packages until Computerland told me about EasyWriter, which offered the features I wanted. I purchased the program and a special Videx card to allow it to work on the Apple computer. With this combination I was able to display and edit text that was a full 80 characters wide and 24 lines deep. This was important to me since I had been brought up on 8½ by 11 inch paper, and this got me as close to that standard size as possible."

One of the first jobs facing Douglas and her personal-computer system was cutting 815 manuscript pages down to about 515 pages by February 1981. "Many authors faced with cutting this many pages from their novel would probably just let the publisher do it," explains Douglas. "But by using EasyWriter—and it took me only a week or so to learn how to use its full power—I was able to make the changes quickly and to keep control of the quality of the book at the same time."

Douglas adds that one of the major problems in making large cuts to a novel is making sure that the transitions from one section to another are both smooth and logical.

"When you cut out large sections and pencil in entirely new transitions, it's almost impossible to see if they really work until they are typed out," says Douglas. "And typing them out, editing them, and re-typing them can be a time-consuming process. So authors sometimes don't spend as much time on the new transitions as they should. With EasyWriter, however, I could simply type in some of

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## OUTLOOK

the preceding text, the new transition, and some of the following text; refine and edit this material directly on the CRT screen; and then print out the new pages. In fact, I generated about 100 new pages in this way. And I'm convinced that the transitions are better than they would have been had I used the traditional approach."

The professional version of EasyWriter that Douglas uses allows her to see the text exactly as it will be printed. According to Douglas, inserting, deleting, and moving words, sentences, or paragraphs is extremely easy—simply a matter of a few keystrokes. As she types, the program automatically decides when to move a word to the next line, a feature called "word wrap."

Whereas the program allows floppy disks to be for-



**Carole Nelson Douglas says that her Apple/Easywriter combination helps with her creative work and paperwork.**

matted in up to 31 files, with a maximum file size of 12,000 characters, Douglas partitions her disks into about 8 to 10 files each, with about 10,000 characters per file. As a result, she has room on each file to make any necessary additions.

"Generally speaking, I give each file a chapter name," says Douglas. "If a chapter requires more than one file, I simply append a letter at the end of the name—for instance, Lady 1 for chapter 1, Lady 2 for the beginning of chapter 2, and Lady 2A, 2B, and so on for the rest of the chapter. By using this technique I can quickly find the text that I want to look at or edit."

As Douglas writes, she stops every 15 minutes or so and instructs the system to transfer what she has just written and stored in computer memory to a master floppy disk, as well as to a back-up floppy in the second disk drive. By backing-up her files in this way, she ensures that only a minimum amount of text will be lost in the event of a power failure or some other problem.



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While using it successfully in her creative work, Douglas has also found that her personal computer speeds the entire process of writing the letters, resumes and proposals that go along with being an author.

"For every book I write now," says Douglas, "I have to develop outlines and proposals for publishers. And various publishers prefer to see proposals structured in different ways. The word-processing program allows me to quickly write a proposal, store it and edit it according to what a publisher is looking for. And it speeds up the process of writing the letters and resumes I must send to publishers and reviewers. If I make a mistake or want to make changes, I simply edit the letter directly on the video screen and the computer prints a new one."

Douglas sees today's publishing world as very business oriented, and feels that writers in general must realize they are part of the business world if they have any hope of making a living from their art. And the key to the business world, says Douglas, is efficiency.

"You can't really be a successful writer today without being efficient," she says. "That's where a personal computer and a word-processing program like EasyWriter come in. They make it possible for a writer to spend his time actually writing instead of having to waste a lot of valuable time on tasks, such as re-typing, that require little creativity."

### A SPORTING NEW UNIT

Computers are rapidly spreading through the magazines that comprise Time Inc. Bruce Hallett, a financial officer for *Sports Illustrated*, first bought a relatively inexpensive Apple personal computer as a learning tool. He hoped that the machine would eventually provide him with enough computer experience to move on to a \$30,000 Dynabyte-based system for the magazine.

As a financial officer, Hallett had a pricing decision to make. Using the machine and VisiCalc from VisiCorp in Sunnyvale, Calif., for an hour without help, he had gone through the program's user manual enough to solve his problem. He then realized that even a computer novice—but a persistent one—could use the machine for problem solving. He then used the computer and VisiCalc to do a competitive study of magazines. It took him only days to do what would have taken months by hand.

After working through these and other applications, Hallett decided that the Apple system no longer met his needs. He felt that CP/M-based software offered more flexibility, and he needed four workstations with a shared data base. Four separate computers wouldn't do it. (Apples can now be networked, and CP/M cards can be added.) The only choice, in his mind, was to upgrade to a multiuser system.

(continued on page 161)

CIRCLE 89

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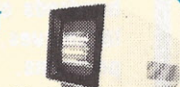
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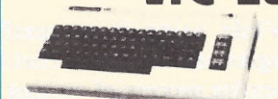
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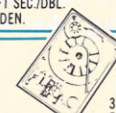
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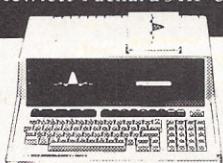
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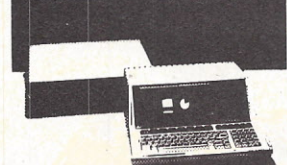


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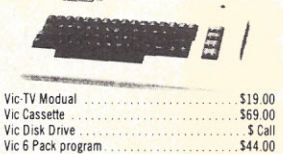
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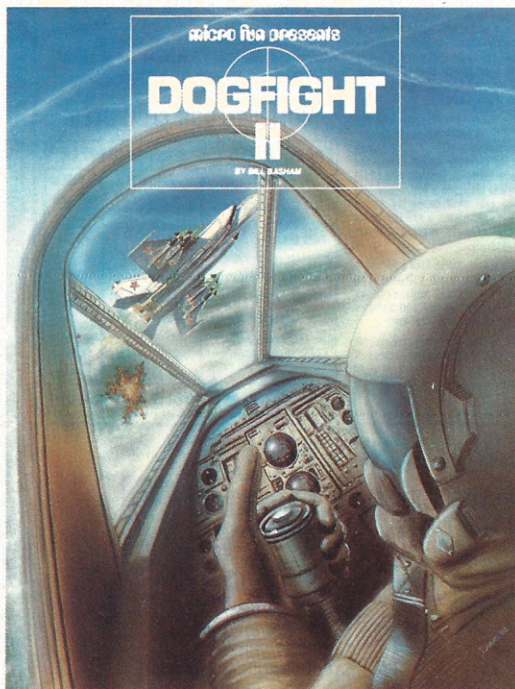


# EXCITING GAMES

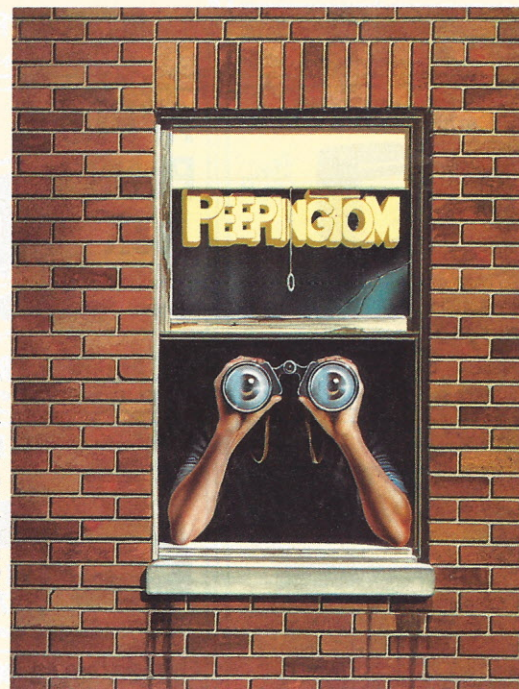
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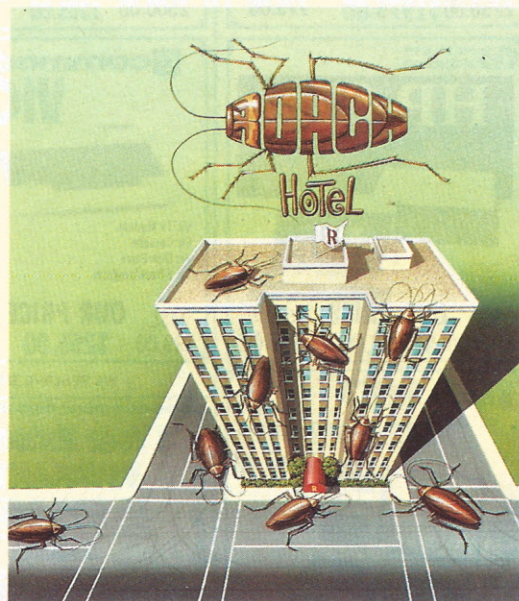
**DOGFIGHT II.**  
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**PEEPING TOM.**  
Another fast-acting arcade thriller. Shoot various aliens you peep at through windows. It takes perception, luck and skill to defeat the invaders.



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**ROACH HOTEL.**  
A high-res, fast-action, arcade game. Stamp out roaches before they take over. Points, bonuses, and additional rounds are earned as your skill increases.

★ For Apple II & 48K  
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CIRCLE 91



## OUTLOOK

### SPORTING NEW UNIT

(continued from page 157)

Hallett looked at the large company offerings—companies like NEC, Wang and IBM—but couldn't settle on one. Wang had a great word processor, but its computing abilities didn't suit him. Hallett proceeded to look at Altos and Dynabyte machines—computers from companies specializing in the type of hardware in which



Bruce Hallett believes that his Dynabyte system has stimulated the imagination of his co-workers and made his job easier.

he was interested. He finally bought a Dynabyte 5300 A2 with a 23mb hard disk drive; a few 8-inch floppy disk drives; four Zentec terminals; and two printers, one from Diablo and one from Anadex.

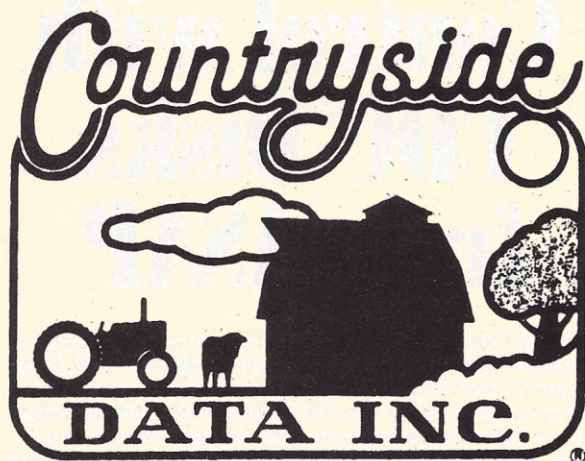
Although this equipment was the solution to one problem, it created others.

"The telling point is: How can I prove cost efficiency? Is there any possibility that we can cut out people to justify the purchase decision?" The second question stopped Hallett from further considerations. He didn't want a computer enough to fire an employee to get it. But then he had an idea concerning the system itself. "It could do two things," he says. "It would be a source for stimulating the imagination of the office, and it would make my job much more interesting and important. Making the job more interesting is a very important managerial goal. People shouldn't just work. I want people to enjoy work and figure out new ways to approach it."

### COMPUTERS IN THE GRAINERY

Bottineau, North Dakota is no metropolis. It's on the high plains, a few miles from the Canadian border. The only computer store in town is Radio Shack. Residents who want other brands have to travel to Minot, some 100 miles away.

Arlin T. Moum, general manager of the Newburg Cooperative Elevator Company in Bottineau, was one such resident. He went to Bismark, far to the south, to



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1241-10	10 Hard Sector	89.6K	1/Single	10/\$25.00
1241-16	16 Hard Sector	71.7K	1/Single	10/\$25.00
1242-00	Unformatted	*	1/Double	10/\$30.00
1242-10	10 Hard Sector	204.8K	1/Double	10/\$30.00
1242-16	16 Hard Sector	163.8K	1/Double	10/\$30.00
1244-00	Unformatted	*	2/Double	10/\$40.00
1244-10	10 Hard Sector	409.6K	2/Double	10/\$40.00
1244-16	16 Hard Sector	327.8K	2/Double	10/\$40.00

\*Unformatted Per User Option

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## OUTLOOK

purchase a computer system to solve his management problems. There, John Axelson of JB Systems developed a procedure to make six Apple II's run a grain elevator. (JB Systems is a spin-off of Jacobson Construction Co., a firm that builds grain elevators, including Moum's.)

Moum first saw the system at a trade show and had it installed in October 1980. The system consists of six



Without the six Apple II Pluses used to run the grain elevator, Arlin Moum would have to hire two more assistants to do the job.

Apple II Pluses, monitors and disk drives, and is used to open the elevator's gates and blends, and start its motors.

"When we started using the system, I called it the '20 questions,'" Moum says, because it used so many prompts to guide users through painstaking menus for the different grain-elevator operations the system controls. "Now JB Systems has speeded up the process so it's 400 times faster."

To help him in this fast-paced operation, Moum has three assistants that he trained on the job. Two of them had no knowledge of computers when they started.

## COMPUTERS IN THE CORNFIELD

East and West Coast chauvinists who think nothing ever happens in the Midwest should turn their sights to Akron, Ohio.

The Akron Public Schools and The Firestone Tire and Rubber Company recently opened the school system's first Microcomputer Center at a dedication ceremony at the Miller Staff Development Center.

Established through a grant from Firestone, the Center



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PC-582



## OUTLOOK

consists of 10 personal-computer stations. Each station includes an Apple II personal computer, a disk drive, an NEC color monitor and an Epson MX-80 printer. The equipment at the 10 stations is valued at \$38,420.

The Microcomputer Center was designed primarily as a staff training laboratory. Programs are offered at levels ranging from an introduction to personal computers to computer skills and applications. The center will make it possible for students, teachers and other staff members to become familiar with basic computer technology. When classes are not in session, the personal computers are available for individual use by staff or students.

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National Data, a direct-marketing response company, is offering 24-hour or next-morning transmission on orders and sales leads to terminals installed in the regional offices of their clients.

"The terminals are faster than express or first-class

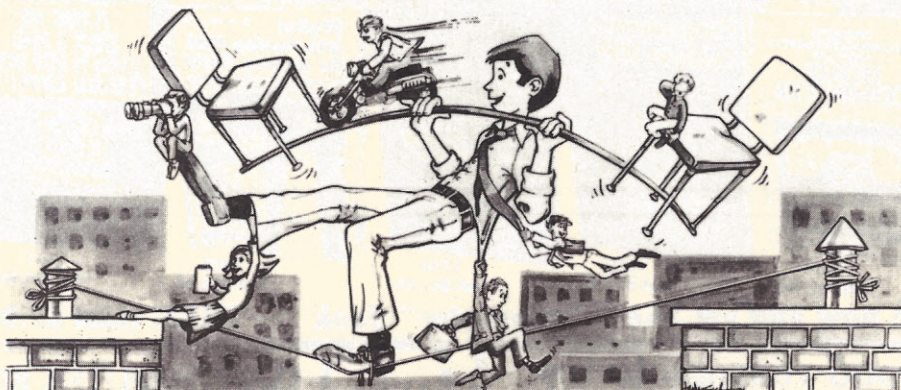
mail, and speed sales follow-up," says Errol Davis, director of sales of the Merchandising Data Services division of National Data Corporation. "Orders and sales leads can be in the hands of the local, district or regional office within hours of receipt of the call at one of our telephone response centers."

Use of the terminals also gives the regional office the ability to measure customer response to advertising, build mailing lists and keep lists of dealers up to date, Davis says.

The Locator Services, which find the dealer nearest to a caller's telephone number or ZIP code, are part of National Data's Merchandising Data Interchange, "a complete merchandise ordering service that processes orders by telephone for both catalog houses and mass merchandisers," says Alfred H. Jorgensen, senior vice president. The Interchange operates 24 hours a day, seven days a week.

Dealer Locator Services provides the consumer with the location of a dealer or merchant where a product or

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## HELPING INMATES OUT

**T**here are some 3.5 million precedent-setting court decisions in the United States, and it's something of a trick to find the one or two cases you really need," says Bill Houk, Corrections Librarian at the Men's Facility



Bill Houk uses his Osborne I to retrieve court decisions for inmates at the Fresno County Men's Correctional Facility.

ity in Fresno County, Calif. Inmates call on him, and his personal computer, to find precedent court decisions that relate to their particular cases.

Houk works for the public sector of the Fresno County Free Library, but his office is behind bars. "We have a regular library in the jail where we store six to 10,000

volumes of books, and we index material on court decisions," Houk says.

In the United States' system of law, once a certain case has been decided, all subsequent similar cases must be decided the same way.

"My Osborne I Computer helps me catalog, index and retrieve court reference material," Houk says. "We use key words to index case information. The computer then searches for the court cases we can use. It gives us information about where the case was located, what it was about, when it was decided, who decided it, and what the general content was. Then we reproduce those cases and hand them out to the inmates."

Houk uses a library index system called the Information Retrieval System, by Island Cybernetics, a Port Aransas, Texas, software house. Before he got a computer, the library was doing all of the indexing on 3 by 5 cards. "If there's anything librarians hate, it's those cards," Houk states.

"I'm trying to get all the libraries in the California jail system to get Osbornes so we can set up a communication system," Houk says. "We could really do great things for a relatively low cost. With a community-service bulletin board, we could help other inmates track down pertinent case information."

Houk recently demonstrated his computer to a committee of senior corrections librarians and sheriffs, including the chief librarian for the Adult Corrections Board. "I don't think they really believed at first that I could do so much on the computer," he says. "But after the demonstration, they decided they had needed a network for a long time."

"I also have visions of mounting the Osborne I on a cart with a battery pack, so library facilities can be carried into those modules that house inmates who can't come to the library because they are escape-prone."

## PUBLICATION FOR HP ENTHUSIASTS

**N**ews 80s, a new quarterly newsletter for HP-85 and HP-83 personal-computer users, provides independent reviews of HP Series 80 hardware and software, feature articles, a beginner's column, and short programs and hints.

A sample issue of the newsletter is available, and provides information about the publication, a review of the HP Assembler ROM, a beginner's column called "For/Next," and some short programming hints.

Subscriptions are \$10 per year, and the sample issue is \$2. News 80s plans to publish four times a year (February, April, August and November).

For additional information about the publication, contact Dale Flanagan, News 80s, P.O. Box 1329, Redondo Beach, CA 90278; (213) 532-3111.



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CIRCLE 97

May 1982 PERSONAL COMPUTING 167



# Making The Computer Bridge Connection

by Thomas Throop

*Editor's note: Relax. The accounts are received and paid, the words processed, the inventory controlled, the kids taught and the meals planned. Surely with all the time you've freed up, there's room for a game or two. How about a few hands of bridge?*

To help the consumer choose a computer bridge game that challenges his skill and strategy, presented here are several deals of play in the Atari version of Bridge 2.0, marketed by Dynacomp in Rochester, N.Y. Versions of the game are also available for the TRS-80 Microcomputer, the Commodore PET and the Apple.

The Atari version of Bridge 2.0 is designed for you to bid and play the South cards. If you become declarer, you also play the North (dummy) cards. If North becomes the declarer, you also play both the North-South cards, although the program does not position the declarer (North) cards at the bottom of the screen with your original (South) cards at the top of the screen. If you become a defender, you play only the South cards during the play of the hand, while the computer plays the North hand.

## Random deals

In addition, the program does not enable you to specify a deal number. Consequently, any deal is truly random, and can never be regenerated. In other words, you can never replay the same deal at a different contract and/or with a different line of play, or compare your play on that deal with a bridge rival.

When bidding as your partner, the program employs the Goren point-count-bidding system, but the documentation alerts you that the program does not know some of the elementary bids in the Goren system. For instance, if you have a two-suited hand and North should support your second suit, it is unable to do so. North will bid something else, and you will be in the wrong contract. In the several deals played, the program never made a takeout double, which is a very basic bid, nor did it overcall 1 notrump, another very basic bid.

Bids that the program does make are included in a few sample deals, shown in figures 1-5.

As dealer in the first deal (figure 1), you open 1 spade with the South hand. Bridge 2.0 as North bids 2 hearts, and you raise to 3 hearts. Now North, despite its 13-point

hand opposite your opening bid, passes incorrectly rather than continuing to 4 hearts.

NORTH		SOUTH	
S	53	S	AKT92
H	KQJ75	H	643
D	K87	D	52
FIG. 1 C	KT9	C	A72

In the second deal (figure 2), North responds one spade over your 1 heart opening bid. You rebid 1 notrump. North, with 13 high-card points, incorrectly bids only 2 spades. (3 notrump or 3 spades is proper.)

NORTH		SOUTH	
S	KQ975	S	T4
H	K43	H	AJ632
D	QT	D	J64
FIG. 2 C	K35	C	AQ4

As dealer in the third deal (figure 3), you open 1 diamond with the South hand. North bids 1 spade, you rebid 1 notrump, North rebids 2 notrump, and you bid 3 notrump. Although this is fine, Bridge 2.0 then bids 4 diamonds with the North hand, which is incorrect and difficult to understand.

NORTH		SOUTH	
S	K936	S	J42
H	AT9	H	K32
D	QT3	D	AK96
FIG. 3 C	QT3	C	A32

With the South hand in the fourth deal (figure 4), you open 1 spade. With 18 points Bridge 2.0 bids only 2 spades, which shows 6-9 points. The proper bid is a temporizing bid of, for instance, 2 diamonds.

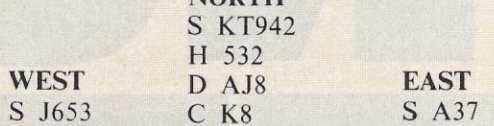
NORTH		SOUTH	
S	AJ93	S	KQT54
H	K5	H	J93
D	AT34	D	75
FIG. 4 C	KQ6	C	AT9

## The enemy bids

In the four deals presented thus far, there has been no bidding by East-West. In competitive bidding situations, Bridge 2.0 seems to pay no attention to what suits are bid by the enemy. Consider the deal in figure 5.

*Maryland-based Thomas Throop has been working with computers for 30 years, since the days of the Uniac 1.*





**NORTH**  
S KT942  
H 532  
D AJ8  
C K8

**WEST**  
S J653  
H -  
D T965  
C T7532

**SOUTH**  
S Q  
H KQ9764  
D 7432  
C A9


**EAST**  
S A37  
H AJT8  
D KQ  
C QJ64

FIG. 5

With the South hand you open 1 heart, West passes, and North bids 1 spade. So far this is fine. But Bridge 2.0 as East then bids 2 hearts. If you pass or double, West passes and East is the declarer at 2 hearts, which was down five tricks in this deal. Clearly East's 2-heart bid is unsuitable, unless it is meant as a cue bid, in which case West should not pass. A double for takeout is the only bid East should consider.

In deals other than those presented, Bridge 2.0 had a strong tendency to rebid weak, unsupported suits at unreasonably high levels. In one deal, for example, with a minimum opening hand including the QJ854 of clubs, Bridge 2.0 opened a club and rebid this suit three times. The suit can't be rebid even a second time without support. On this same deal a six card spade suit was rebid twice, and Bridge 2.0 was rebidding its clubs instead of supporting the spade suit with the AKQ of spades for trump support.

In only a few deals did Bridge 2.0 bid correctly to arrive at the proper final contract. Once the bidding phase of the product is completed, you must play the contract that has been reached in the bidding.

In other deals played all the way through, the declarer and defensive plays by the declarer were rather weak. Unfortunately, you cannot play a deal looking at all four hands to judge how the program performs during the play of the hand. Neither can you see all of the hands at the conclusion of the play of the deal. 

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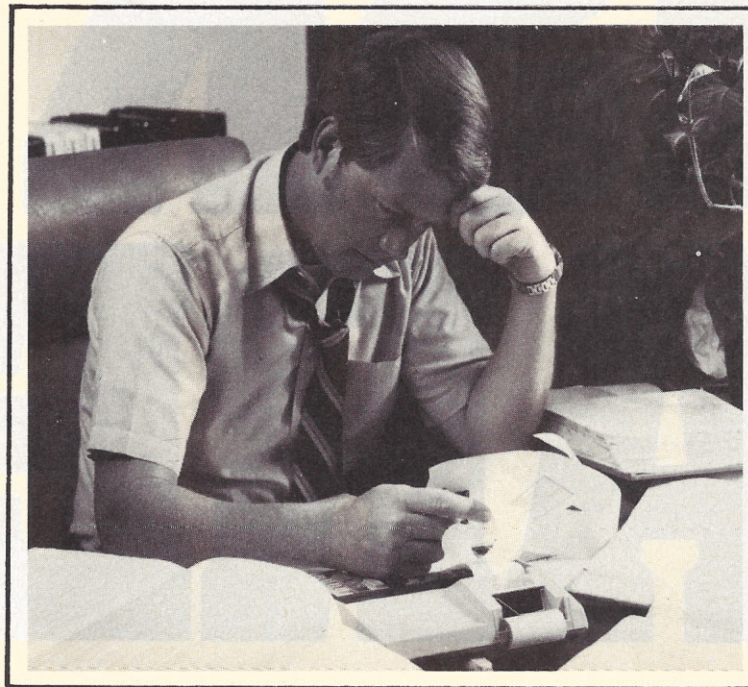
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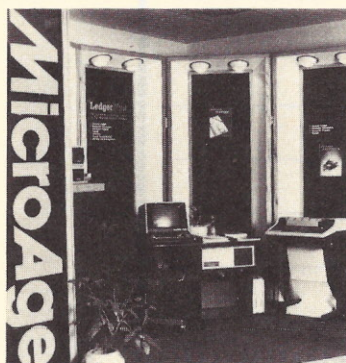
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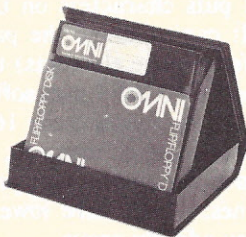
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## **Corvus Debuts Executive Workstation; Cromemco Announces Dual-Processing**

### **CORVUS' CONCEPT—16-BIT POWER AT POPULAR PRICES**

Using the power of its 16-bit processor, the Motorola 68000, Corvus Systems prototype CONCEPT debuts with lots of easy-to-use features, and a thin \$5000 price tag.

"We designed the system this way by considering what the user looks for in a computer system, not what we thought the system should be," says Mark Hahn, Corvus' vice president of research and development. "For example, we used the power of the 68000 microprocessor and the large amount of cheap RAM to implement an operating system that can do a lot of things but isn't a mystery to the user."

The CONCEPT is intended as an executive workstation that will operate on the Corvus Omninet network, a 1-Mbit/second local net, or as a stand-alone unit. Omninet, whose workstations share a Winchester disk of five to 80 Mbyte capacity, can include other personal computers, like Apples, but those machines need additional hardware added before they can be integrated into

the net. The CONCEPT has the interface built in. In addition, it has powerful features in the software that make it a true representative of the next generation of personal computers. Says Hahn, "This system was designed to be the Model-T—the standard. We think it will be to this generation what the Apple II was to the 8-bit generation."

### ***The hardware***

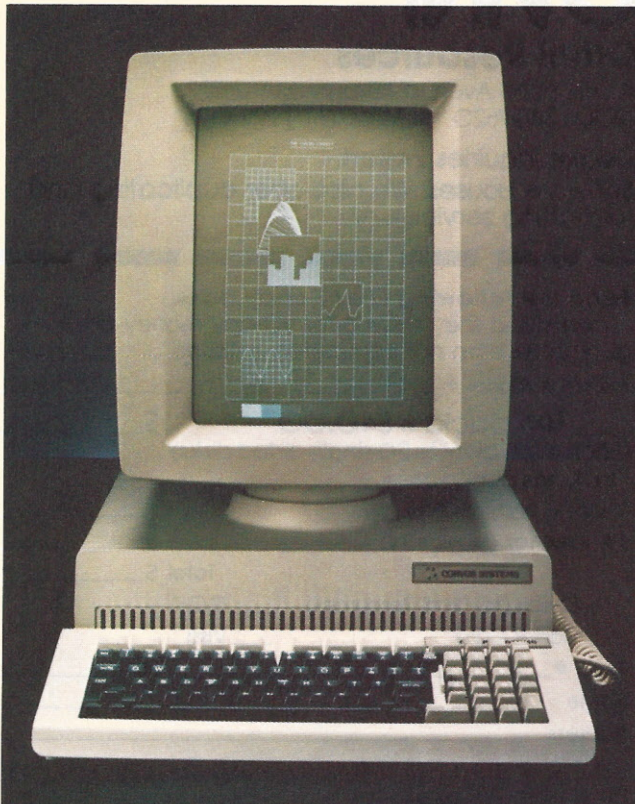
The hardware specifications alone are impressive. Start with the 68000 microprocessor, which many say is the best of the 16-bit processors around today, although others would disagree. Add to that the minimum memory of 256 kbytes, and the basic system is more powerful than many mainframe computers of just a few years ago. (Most larger personal computers start with 64 kbytes of memory, and can be expanded to 256k. The CONCEPT's memory goes all the way to a half Mbyte.) Added to these basic hardware pieces are two serial ports for connecting such peripherals as serial printers or modems and the Omninet interface.

But probably the most unusual hardware feature of the CONCEPT is the display screen. Its diagonal measure (the standard way TV screens are measured) is 15 inches—larger than that of most personal computers. It can be used in either a horizontal or vertical orientation, by simply unlatching a keeper on the screen's pedestal, and rotating the display. In the vertical orientation, the screen can display 72 lines of 80 characters each, and it's horizontal orientation gives it 56 lines of 120 characters each. The display can be swiveled and tilted in either orientation for operator comfort.

### ***It goes both ways***

This dual orientation is unique, and is impossible for most personal computers. Most of these machines use a piece of hardware called a character generator. That integrated circuit puts characters on the screen in one orientation only. It can't change the pattern of dots (called pixels, short for picture elements) that makes up the character. But the CONCEPT uses software to generate characters. It can do this because the 16-bit processor is so fast, and addresses so much memory, that software character generation is feasible in this product, while it isn't in 8-bit machines, which have lower throughput and a smaller memory-address space.

The display is bit-mapped, which means that each pixel is represented by a bit in memory. Each pixel can thus be individually controlled—a plus when graphics is needed.





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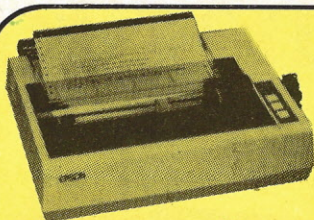
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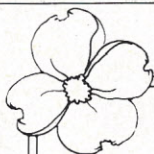
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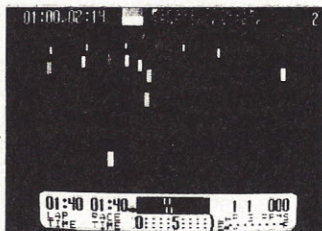
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## HARDWARE OF THE MONTH

The display can turn on 720 pixels in the long (11-inch) direction, and 560 along the 8.5-inch axis.

### First things first

Although the machine's ability to output information is impressive, the user still needs to input directions and data. This input goes on at the keyboard.

The separate keyboard has an IBM-Selectric-like QWERTY pad (that term comes from the leftmost keys on the top line of letters), a separate 14-key numeric pad (like a calculator's keyboard, for fast numeric data entry) and 10 function keys that are defined by applications software. The current function of the key is displayed in a "window" on the display screen. For example, if a user were running a word processor, one of the function keys might be a character-delete key. The lower part of the screen would then show that key number as the character-delete key, so the user doesn't have to remember that function.

### What's not there?

Industry watchers will be quick to note that there is no "mouse" attached to this machine. A mouse is a device that allows easy control of the cursor's location, and the Xerox Star workstation has one. The Star also costs \$10,000. Corvus says it is actively investigating the availability of low-cost mice for addition to the system as an option. If and when a mouse is added, it will make the selection of things like program options from a menu displayed on the screen even simpler than it is now with a keyboard.

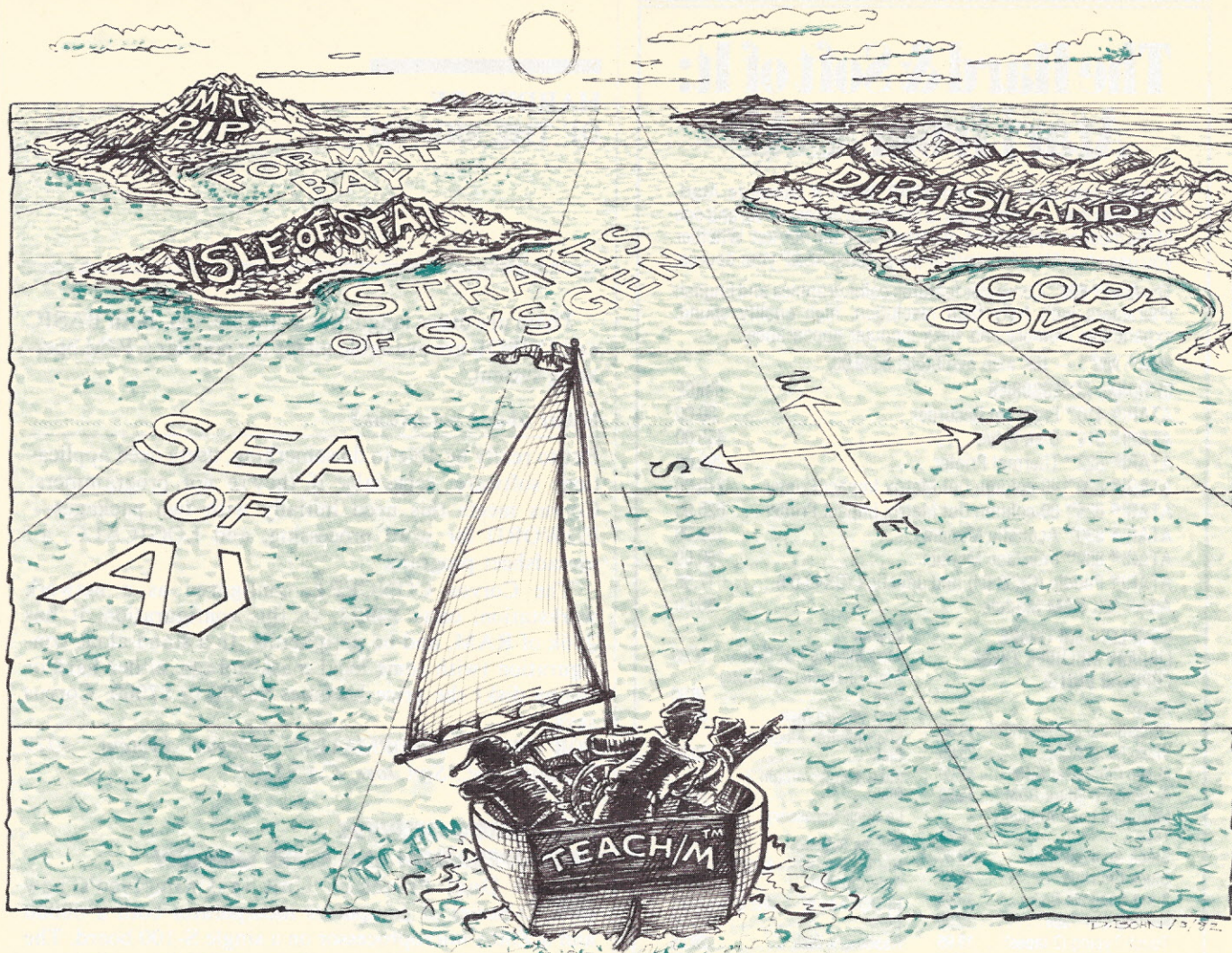
### In this corner—software

Just as there are no joysticks, light pens, touch screens, et al, there is no game software. But the other software available with the CONCEPT will more than make up for the dearth of games.

The operating system is written in native code (machine language). This means it should be faster and more efficient than software written in a high-level language and compiled to native code. The operating system can support subtasks, a device that allows a program to run another as a subordinate program. It will also allow multiple windows on the screen, each with a different program in it. While only one window can be active at a time—this is not a multitasking operating system—operation in any window can be suspended and activity begun in a second window. Thus a user could suspend a data-entry application to check his personal calendar for the day's appointments.

Closely allied to the operating system are the programming languages that are supplied. Both the FORTRAN 77 (the latest standard version) and Pascal compilers are available.





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## HARDWARE OF THE MONTH

There are other languages available, too. Both BASIC and COBOL are available under the popular CP/M operating system.

### What about solutions?

But to really be able to do something, users need applications software, especially if they're not programmers. Corvus meets this need initially with two packages—EDWORD for word processing, and LOGICALC, a spreadsheet program.

The Corvus CONCEPT, configured as a network workstation, costs \$4995. In this configuration, it has 256k of RAM, and no peripherals. In a stand-alone configuration (with some local mass storage, either hard or floppy disk) the price becomes \$6000 to \$7000, Corvus says.

**FOR MORE INFORMATION** Corvus System, 2029 O'Toole Ave., San Jose, CA 95131.

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Dual processing ensures compatibility with the wide range of existing software that runs on machines employing the 8-bit Z80A microprocessor, and allows the use of such 68000-based systems as FORTRAN 77, COBOL 80, Pascal and others.

Cromemco has also introduced several system configurations incorporating the new 68000 board set into its System One and System Three computers. A 68000-based System One, with dual 5-inch floppy disk drives, is available with either 256k or 512k of memory. With 256k the price of the System One is \$5495, and with 512k it costs \$6495.

Cromemco's System Three with dual 8-inch floppy disk drives is also available with the 68000. With 512k of memory, the system is priced at \$9995.

**FOR MORE INFORMATION** Cromemco, 280 Bernardo Ave., Mountain View, CA 94043.

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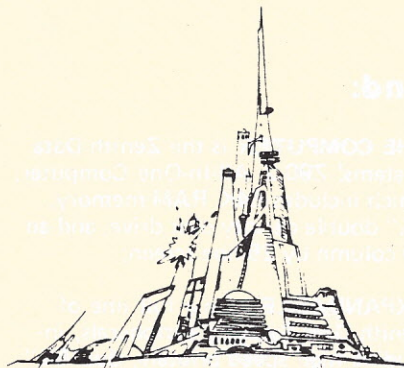
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## HARDWARE OF THE MONTH

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The printer uses standard fanfold paper, up to 9½ inches in width, and allows dot graphics, alphanumeric characters, and double-width characters to be mixed within a single line.

The GP100 uses a rotating platen with protruding lengthwise splines, positioned behind the paper. The character or graphics image is formed by multiple-hammer strikes in rapid succession as the print head advances across the paper in front of the rotating platen. A precision gear train ensures the exact positioning of the print hammer relative to the splines on the platen, providing excellent print quality and uniformity of the 5 by 7 dot matrix, the company says.

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According to Jeffrey A. Rochlis, president and chief executive officer, the device breaks a major barrier in the business computing industry. "The barrier is that most professionals, whose jobs are dependent upon inputting and receiving data from computers, can't communicate directly with the system because access and operating procedures are still far too complex," he says.

Ease of use is made possible through single-button access to any host computer, and the potential to communicate with the computer in English. The typewriter-like keyboard, 16-character dot-matrix display, one-button automatic dialer and log-on system, and 300 baud Bell 103-compatible telephone modem are all contained in a small, 13-ounce package.

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**FOR MORE INFORMATION** *IXO, 6041 Bristol Pkwy., Culver City, CA 90230; (213) 417-8080.*

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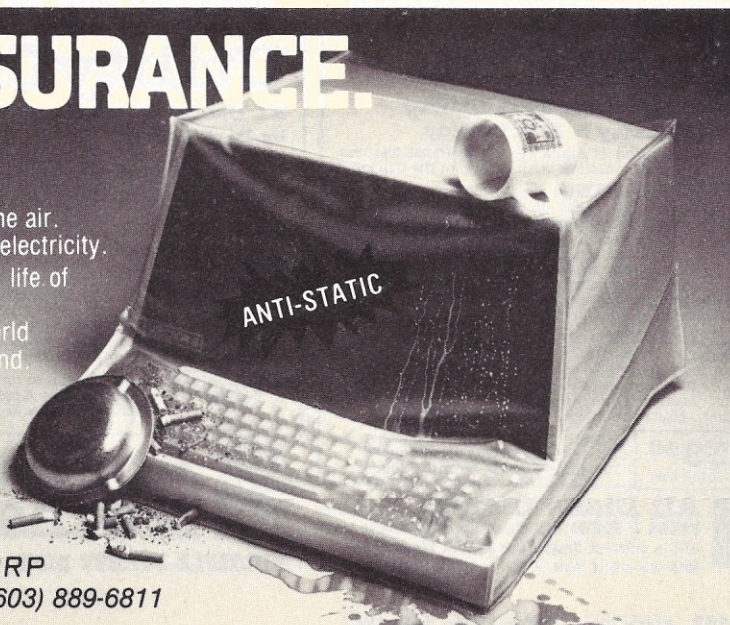
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## HARDWARE OF THE MONTH

byte 5 1/4-inch hard-disk drive, a metal cabinet with a fan, its own power supply, a transformer, all necessary cables, a DMA controller, a CP/M 2.2 operating system, and Microsoft BASIC 80.

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**FOR MORE INFORMATION** Morrow Designs, 5221 Central Ave., Richmond, CA 94804; (415) 524-2101.

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**T**wo new quiet, compact, personal information terminals are designed specifically for easy one-button information access by non-computer professionals. The two Scanset units have the same basic abilities to communicate with computers as larger, more expensive terminals. The units only use about one square foot of space, and are small enough to fit inconspicuously on a desk top.

Built for flexibility and ease of use, the terminals feature user programmable function keys, a 9-inch diagonal

screen with 24 lines of text and 40- or 80-character line lengths and limited graphics capabilities.

The terminals are expected to be used in offices, manufacturing plants, banks, hospitals, warehouses, retail stores and in the home. They can also be used in electronic-mail applications.

Both Scanset models have six multifunction keys which can be programmed either by the user from the keyboard, or remotely from the computer. Up to 12 user-defined tasks can be assigned to the programmable keys, giving the user access to host computers or frequently used data bases. They can also be programmed to handle repetitive jobs.

The autodial feature of the Model 415 can dial up to 36 phone numbers stored in the terminal's memory, automatically connecting the terminal to computers or data bases. The first four numbers can also be used for automatic computer log-in. In addition, this feature can be used as an autodialer for a regular telephone. A directory of all numbers, with descriptions, is stored in the terminal



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by Bert Kersey & Jack Cassidy

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PCM



## HARDWARE OF THE MONTH

and is available on-screen at the press of a key.

The user can view 24 lines of text at one time, with a choice of either 40- or 80-character line lengths. Automatic scrolling takes place after the 24th line of text is filled. A 25th line appears at the bottom of the screen, immediately above the function keys, and displays labels for the programmable keys.

A printer or other device can easily be connected to the Seasnet through an intelligent peripheral port. This allows a printer to print information either directly as it is received through the terminal from a computer, or as it appears on the terminal screen.

The Model 410, with automatic computer log-in, sells for \$495. The Model 415, with built-in modem, automatic telephone dialer, and automatic computer log-in, is priced at \$649.

**FOR MORE INFORMATION** Tymshare, 20705 Valley Green Dr., Cupertino, CA 95014; (408) 446-6000.

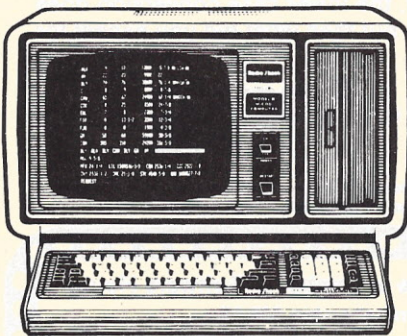
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**FOR MORE INFORMATION** Commodore Business Machines, Computer Systems Division, 681 Moore Rd., King of Prussia, PA 19406; (215) 337-7100.



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# HARDWARE INDEX

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PRODUCTS/FEATURES/PRICE

COMPANY/AVAILABILITY

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D-Series incorporates  
incorporates a 68000 and  
a Z-80A microprocessor  
\$995

Cromemco  
Mountain View, CA 94043  
retail  
see story on page 178  
CIRCLE 215

### UNDER \$7500

Business System 200  
based on TMS9900  
16-bit microprocessor  
\$6200

Texas Instruments  
Austin, TX 78769  
retail  
CIRCLE 216

Concept Personal Computer  
16-bit personal computer  
with 256k of RAM  
\$5000

Corvus Systems  
San Jose, CA 95131  
retail  
see story on page 174  
CIRCLE 217

Series 5  
allows three users to share  
a common data base  
\$2000 per station

Altos Computer Systems  
San Jose, CA 95131  
retail  
CIRCLE 218

### OVER \$8000

System 83  
executes approximately one  
million instructions per second  
from \$8295

Dual Systems Control  
Berkeley, CA 94710  
retail  
CIRCLE 219

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supports up to four terminals  
\$8998

GIMIX Inc.  
Chicago, IL 60609  
mail order  
CIRCLE 220

## MASS STORAGE

### HARD DISK DRIVES

Discus M5  
5 megabyte fixed disk system  
for S-100/IEEE 696 bus computers  
\$2495

Morrow Designs  
Richmond, CA 94804  
retail  
CIRCLE 221

Model LS525  
five megabyte capacity  
for TRS-80 Models I and III  
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The General Manager	149.95	109.95
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Shattered Alliance (D)	39.95	29.95
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(C) Requires CP/M\*  
(T) Tape only  
(T/D) Tape or disk  
(K) Cartridge

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## HARDWARE INDEX

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offers storage capacities of 6,  
12 or 18 megabytes per drive  
for IBM Personal Computer  
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Datamac Computer Systems  
Sunnyvale, CA 94086  
retail  
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### FLOPPY DISK DRIVES

I-47  
8-inch floppy disk system  
for Heath/Zenith computers  
\$2795

Data Compass  
Anaheim, CA 92806  
mail order and retail  
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I-48  
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double-sided drives  
for Apple II and TRS-80 Model II  
\$2095

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### TAPE DRIVES

TD 2802  
single drive subsystem  
for S-100  
\$3580

Systems Group  
Orange, CA 92668  
mail order  
CIRCLE 226

## PRINTERS/PLOTTERS

### UNDER \$1500

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single heavy-duty  
print hammer  
\$389

Axiom Corporation  
San Fernando, CA 91340  
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detached-keyboard model  
with a tiltable rotating display  
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USI International  
Brisbane, CA 94005

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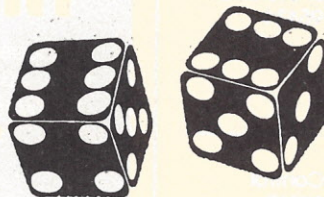
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DBCALC (with 1040 model included) requires VisiCalc™ .....\$2

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# microplan<sup>TM</sup>

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AUTOMATIC  
WHAT-IF

MODE=NORMAL ORDER=R/O ROW=1-5

ROW 1 (Net Sales) <--  
ENTER COMMAND:

ROW	First Quarter	Second Quarter	Third Quarter	Fourth Quarter		
1 Net Sales	1,000.0	1,100.0	1,210.0	1,331.0	4,641.0	45 NAME
2 Cost of Good	450.0	489.5	532.4	579.0	2,050.9	46 IN LINE
3 Gen & Admin	200.0	220.0	242.0	266.2	928.2	47 INTEGER
4 Res & Develo	300.0	350.0	400.0	450.0	1,500.0	48 ROUND
5 Total Costs	950.0	1,059.5	1,174.4	1,295.2	4,479.1	49 CUMULATE
6 Gross Profit	50.0	40.5	35.6	35.8	161.9	50 ABSOLUTE
7 % Profit	5.0	3.7	2.9	2.7	3.5	51 ADD K
8	0.0	0.0	0.0	0.0	0.0	52 SUB K
9	0.0	0.0	0.0	0.0	0.0	53 MULT K
10 % C.O.G.S.	45.0	44.5	44.0	43.5	0.0	54 DIV K
11	0.0	0.0	0.0	0.0	0.0	55 SUM
12	0.0	0.0	0.0	0.0	0.0	56 GET
13	0.0	0.0	0.0	0.0	0.0	57 ZERO
14	0.0	0.0	0.0	0.0	0.0	58
15	0.0	0.0	0.0	0.0	0.0	59
16	0.0	0.0	0.0	0.0	0.0	
17	0.0	0.0	0.0	0.0	0.0	

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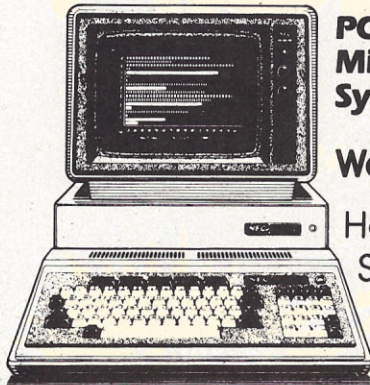
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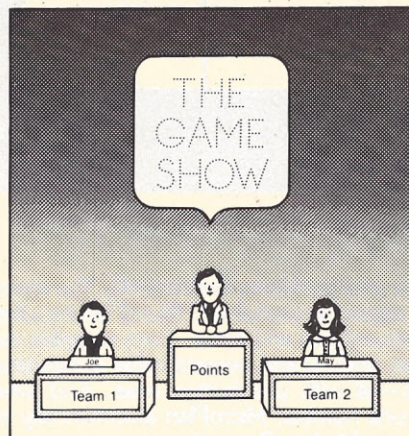
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## HARDWARE INDEX

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CIRCLE 229

Pi-2  
12-inch green  
phosphor display  
\$275

USI International  
Brisbane, CA 94005  
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CIRCLE 230

Scanset Model 410  
automatic computer log-in  
\$495

Tymshare  
Cupertino, CA 95014  
mail order  
see story on page 182  
CIRCLE 231

Scanset Model 415  
built-in modem, automatic  
telephone dialer  
\$649

Tymshare  
Cupertino, CA 95014  
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see story on page 182  
CIRCLE 232

## COMMUNICATIONS

### MODEMS

Series 80 Data  
Communications Solution  
communication with both  
mainframe computers and  
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for HP Series 80  
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for VIC 20  
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Machines  
King of Prussia, PA 19406  
see story on page 184  
retail  
CIRCLE 234

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perform remote data entry  
and retrieval  
approximately \$500

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Culver City, CA 90230  
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CIRCLE 235

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expands to 176k RAM  
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Magnolia Microsystems  
Seattle, WA 98119  
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CIRCLE 237







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CIRCLE 115

May 1982 PERSONAL COMPUTING 189



## Business Software Update: Financial Planning, Text Processing And Accounting

### GRAPHICS FOR THE EXECUTIVE

**P**ersonal computers may be easy to use in some areas, but graphics hasn't been one of them—until now. The GRAPH software package, from Software Publishing Corp., is an easy-to-use, menu-driven package aimed at the executive who believes a picture is worth a thousand columns of numbers.

Supplied on Apple DOS 3.3 diskettes, the package runs on the Apple II. A version for the Apple III will be available later this year, the company says.

To fully appreciate the capabilities of GRAPH, consider the following mythical scenario, involving a certain Anne, a marketing analyst for a growing California Vintner.

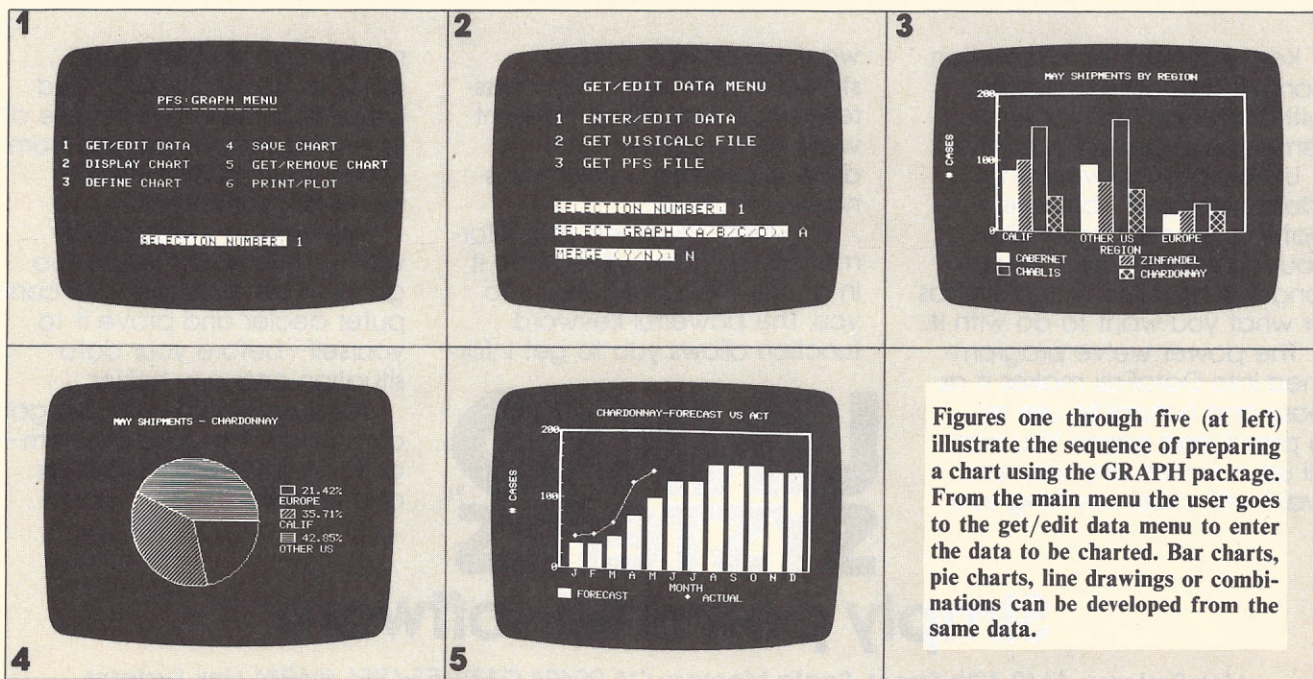
Anne is preparing for a meeting that will determine the winery's future bottling requirements. She has been asked to prepare an analysis that includes a comparison of all case sales by wine type and geographic area, and a separate review of chardonnay, the vintner's up-and-coming wine. She will analyze chardonnay sales for the year-to-date by region, and compare them to earlier forecasts.

To prepare her analysis, Anne decides to generate graphs and charts that will enable her to make quick comparisons. For this she plans to use GRAPH. Anne is familiar with the Apple, but she has not used the graphics package before today. Software Publishing says GRAPH produces bar, line and pie charts of presentation quality in minutes—a claim Anne plans to test.

After the GRAPH diskette is booted, a menu appears on the Apple monitor (see figure 1). Anne selects the ENTER/EDIT DATA option, and a second menu, GET/EDIT DATA MENU, appears on the monitor (see figure 2). From this menu, she selects the ENTER/EDIT DATA option again, because she plans to enter original data instead of recalling data stored in VisiCalc or PFS files. (GRAPH can access files created by either program.)

Anne begins entering data via the keyboard from the winery's May report of case shipments by wine type and geographic area. The first graph will be the number of cases of cabernet shipped from California to the rest of the United States and to Europe.

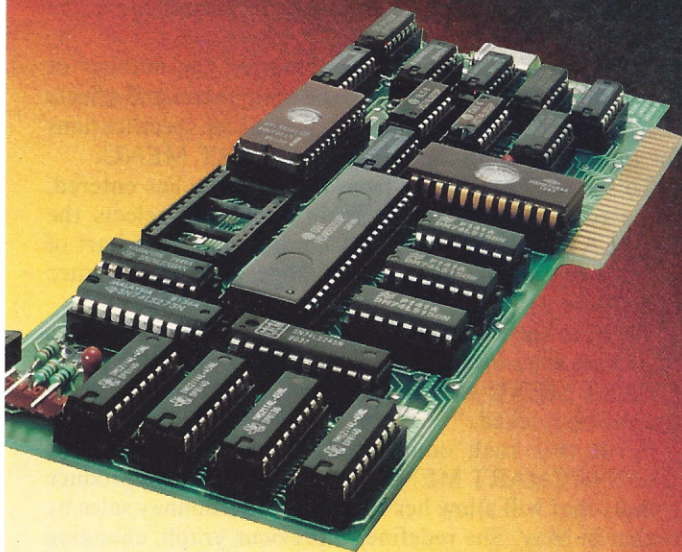
Next, Anne enters data on case shipments of zinfandel,



Figures one through five (at left) illustrate the sequence of preparing a chart using the GRAPH package. From the main menu the user goes to the get/edit data menu to enter the data to be charted. Bar charts, pie charts, line drawings or combinations can be developed from the same data.



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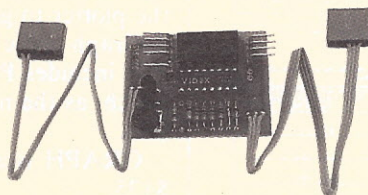
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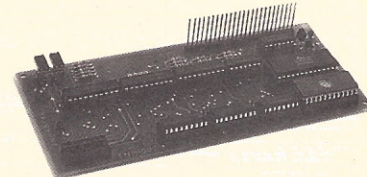
CIRCLE 48

### SOFT VIDEO SWITCH



The Soft Video Switch is an automatic version of the popular Switchplate. It knows whether it should display 40 or 80 columns or Apple graphics. It does the tedious work of switching video-out signals so you don't have to. The Soft Video Switch can be controlled by software. May be used with any Videoterm with Firmware 2.0 or greater. The single wire shift mod is also supported. Package price is \$35.00.


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CIRCLE 171

## SOFTWARE OF THE MONTH

chablis and chardonnay. After entering the number of cases shipped, Anne returns to the main menu and selects the DEFINE CHART option. She enters specifications for this chart using the DEFINE CHART MENU.

To see the chart made from the data she has entered, Anne returns again to the main menu and selects the DISPLAY CHART option. A comparative bar chart of all four graphs, A, B, C and D, appears on the monitor (see figure 3).

Then, to see how much each wine type contributes to total wine sales in a region, Anne returns to the DEFINE CHART MENU via the main menu and directs that the graphs be stacked.

With this task completed, Anne returns to the DEFINE CHART MENU via the main menu to produce a chart that will allow her to analyze chardonnay sales by region in May. She redefines a previous graph, changing it from a bar chart to a pie chart (see figure 4).

Anne then compares chardonnay shipments to date this year that she enters via the keyboard. Monthly forecasts are stored in a VisiCalc file by returning to the main menu and selecting ENTER/EDIT DATA for each graph. She prepares a chart that presents her actual data as a line graph and presents monthly forecasts as a bar graph (see figure 5).

Satisfied with the graphs and charts she has created, Anne stores them on a separate diskette. She then prints all four charts. GRAPH interfaces with an Apple Silen-type printer, an Epson printer, any printer connected to the Apple via the Grappler Card or the HP 747A plotter for high-quality color charts on transparencies or paper.

For this meeting, Anne selects charts in an 8½-inch by 11-inch size. She could also print them in a 3-inch by 4-inch size.

The process of generating and printing four charts took Anne less than 30 minutes.

Had Anne desired color charts, they could have been generated on the plotter, the company says. If more than one color was needed, pause commands could have been included in the package to allow Anne to change pens in the plotter to get different colors.

Graph is the latest member of the PFS software series that includes PFS, a personal filing system, and Report, which, as the name implies, prints reports from the PFS files.

GRAPH is available from computer stores, and costs \$125.

**FOR MORE INFORMATION** Software Publishing Corp., 1901 Landings Dr., Mountain View, CA 94043.

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(continued on page 196)

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4. FREQUENCY OF ISSUE MONTHLY	5. A. NO. OF ISSUES PUBLISHED ANNUALLY 12	6. B. ANNUAL SUBSCRIPTION PRICE \$18.00	
7. COMPLETE MAILING ADDRESS OF KNOWN OFFICE OF PUBLICATION (Street, City, County, State and ZIP Code) (Not printers)			
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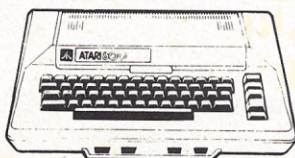
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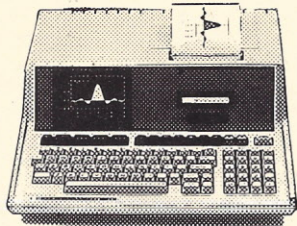
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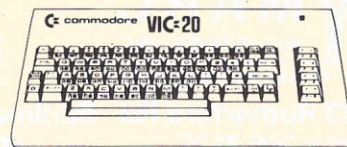
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JC-1201M(A) 12" Color Composit	495	329
JC-1201DH 12" Color RGB	1095	949
JB-1201M(A) 12" Green Composit	210	169

### EPSON PRINTERS:

	list	FUTRA
MX-80 Dot Matrix Printer	645	455
MX-80/FT Friction/Tractor Ver	745	555
MX-100 Wide Carriage Printer	995	725

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	list	FUTRA
5.0 MBYTE "DAVID-1" 5 Megabyte	2995	2299
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5" 7440 Head Cleaning Kit	30	24	8" 7400 Head Cleaning Kit	30	24

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	list	FUTRA
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NEC A/R - Inv. - Payroll - Job cost	395 ea.	269 ea.
NEC Select Word Processing	495	371
NEC CP/M	150	129
NEC Report Manager	200	149
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## SOFTWARE OF THE MONTH

(continued from page 192)

able and accounts receivable) offer product modularity, eliminating redundant processing steps characteristic of most competitive products. Each program can either stand alone or be combined with other programs. The applications can also be changed by the user to meet his specific needs within the bounds of the system design.

Features of the packages include: simplified user installation; a patent-pending "workstation" easel with built-in disk protection; clear, concise documentation that allows first-time users to begin using the software immediately; entry-validation procedures that eliminate error recovery problems; and a "look-ahead" capability that ensures ample file space before an updated process begins.

The modules run on the Apple II (\$395 to \$495) and on the Apple III (\$495 to \$595).

FOR MORE INFORMATION *State of the Art, 3183-A Airway Ave., Costa Mesa, CA 92626; (714) 850-0111.*

## BRINGING EDUCATION INTO THE HOME

**R**adio Shack has introduced two new educational software series for the TRS-80 Color Computer. The first is a motivational reading series, Reading is Fun, which presents four classics: *Dracula*, *Hound of the Baskervilles*, *Moby Dick* and *20,000 Leagues Under the Sea*. The second series, *Pioneers in Technology*, has two volumes, *History of Technology and Inventions that Changed Our Lives*.

Reading is Fun uses motivational learning techniques in presenting reading, listening and drill sequences for children in the four through six grade level. Each story is presented with an illustrated reader and a read-along audio cassette tape. This combination is designed to motivate children to read along with a dramatic oral presentation of the story, and to provide a listening exercise to help increase the child's enjoyment and comprehension of the story, the company says. Correct answers to drills on spelling and vocabulary are rewarded immediately. Progress is reported after every 10 problems.

The *History of Technology* series was prepared with the Radio Shack Talk/Tutor System, which allows the use of high-resolution graphics, recorded speech and sound effects. Questions about lessons are interspersed throughout each presentation. Students receive immediate reinforcement for correct answers, and wrong answers are corrected. A "score board" at the end of each lesson shows the student both the number of correct answers and the percentage of correct answers.

Each of the Reading is Fun series is available for \$14.95. The *History of Technology* is available for \$94.95.

FOR MORE INFORMATION *Contact your local Radio Shack store or Computer Center, or Radio Shack, 1800 One Tandy Center, Fort Worth, TX 76102.*

CIRCLE 173



# SOFTWARE INDEX

A COMPREHENSIVE LISTING OF NEW PRODUCTS

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PRODUCTS/FEATURES/PRICE COMPANY/AVAILABILITY

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accounting for up to  
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mail order  
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for accounting  
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Systems  
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transportable integrated  
accounting system  
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see story on page 192  
CIRCLE 257

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for Commodore CBM  
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Philadelphia, PA 19104  
retail  
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Management System  
management information for  
commercial income  
for CP/M-based systems  
\$995

Realty Automation  
La Habra, CA 90631  
mail order  
CIRCLE 262

Data Base ///  
features user designed screens  
for Apple III  
\$175

Creative Software  
Cypress, CA 90630  
mail order  
CIRCLE 263

Depreciation  
depreciates up to 800  
capital assets  
for Apple II  
\$225

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CIRCLE 265

Executive Briefing System (EBS)  
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LA120 DECwriter III RO	2,095	200	112	75
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VT101 CRT DECscope	1,195	115	67	43
VT125 CRT DECscope	3,295	315	185	119
VT131 CRT DECscope	1,745	167	98	63
VT132 CRT DECscope	1,995	190	106	72
VT18XAC Personal Computer Option	2,395	230	128	86
<b>TEXAS INSTRUMENTS</b>				
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T1765 Bubble Memory Terminal	2,595	249	138	93
T1 insight 10 Terminal	695	67	37	25
T1785 Portable KSR, 120 CPS	2,395	230	128	86
T1787 Portable KSR, 120 CPS	2,845	273	152	102
T1810 RO Printer	1,695	162	90	61
T1820 KSR Printer	2,195	211	117	80
<b>LEAR SIEGLER</b>				
ADM3A CRT Terminal	595	57	34	22
ADM5 CRT Terminal	645	62	36	24
ADM32 CRT Terminal	1,165	112	65	42
ADM42 CRT Terminal	1,995	190	106	72
<b>DATAMEDIA</b>				
EXCEL 12 CRT Terminal	1,695	162	90	61
EXCEL 42 Smart Buffered CRT	995	96	54	36
COLORSCAN 10 Color CRT	3,195	307	171	116
<b>TELEVIDEO</b>				
925 CRT Terminal	850	82	46	31
950 CRT Terminal	1,075	103	57	39
<b>NEC SPINWRITER</b>				
Letter Quality, 7715 RO	2,895	278	154	104
Letter Quality, 7725 KSR	3,295	316	175	119
<b>GENERAL ELECTRIC</b>				
2030 KSR Printer 30 CPS	1,195	115	67	43
2120 KSR Printer 120 CPS	2,195	211	117	80
<b>HAZELTINE</b>				
Executive 80/20	1,345	127	75	49
Executive 80/30	1,695	162	90	61
<b>EPSON</b>				
MX-80 F/T Printer	745	71	42	27
MX-100 Printer	895	86	48	32
<b>TIMEPLEX</b>				
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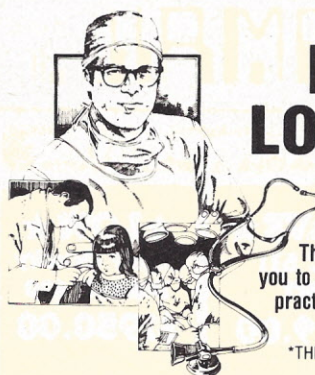
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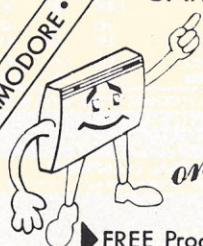
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CIRCLE 122

## SOFTWARE INDEX

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GRAPH menu-driven graphics package for Apple II \$125	Software Publishing Corp. Mountain View, CA 94043 retail see story on page 190 CIRCLE 268
Mail Manager professional mailing system for IBM Personal Computer \$49	Starware Washington, DC 20006 mail order CIRCLE 270
Master Construction Cost Estimating and Project Monitoring System specification oriented cost estimating for Apple II \$295	Esticomp Software Systems Knoxville, TN 37919 mail order CIRCLE 271
MASTERPLAN time-sharing oriented modeling package for OASIS-based systems \$495	Phase One Systems Oakland, CA 94621 retail CIRCLE 272
MOS-2 simplify medical office management for TRS-80 Model II \$499	Windham Software Willimantic, CT 06226 mail order CIRCLE 273
MR Edit video text editor for CP/M or MP/M based systems \$90	Micro Resources Corp. Nashville, TN 37221 mail order CIRCLE 274
Personal Investor update portfolio and retrieve business news for Apple II \$95	PBL Corporation Wayzata, MN 55391 retail CIRCLE 275
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Scene from BETA FIGHTER during creation using the DRAWPIC graphics editor.

**HODGE PODGE:** by Marsha Meredith (Atari and Apple)  
NOW AVAILABLE FOR ATARI!!!! This captivating program is a marvelous learning device for children from 18 months to 6 years. HODGE PODGE consists of many cartoons, animation and songs which appear when any key on the computer is depressed. A must for any family containing young children.  
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**PM EDITOR:** by Dennis Zander (Atari, 16K)  
Create your own fast action graphics game for the Atari 400 or 800 using its player missile graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (PO\$(Y)=SHIP4). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in ARTWORX RINGS OF THE EMPIRE and ENCOUNTER AT QUESTAR IV.  
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**ROCKET RAIDERS** by Richard Petersen (Atari 24K)  
Defend your asteroid base against pulsar bombs, rockets, lasers, and the dreaded "stealth saucer" as aliens attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures.  
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**FOREST FIRE!** by Richard Petersen (Atari, 24K)  
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**GIANT SLALOM:** by Dennis Zander (Atari, 16K)  
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**THE PREDICTOR** by Thomas Barker (Apple, Atari, TRS-80, North Star and CP/M (M-BASIC))  
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**PILOT:** by Michael Piro (Atari, 16K)  
Pilot your small airplane to a successful landing using both joysticks to control throttle and attack angle. PILOT produces a true perspective rendition of the runway, which is constantly changing. Select from two levels of pilot proficiency.  
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**TEACHER'S PET:** by Arthur Walsh (Atari, Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems)  
This is an introduction to computers as well as a learning tool for the young computerist (ages 3-7). The program provides counting practice, letter-word recognition and three levels of math skills.  
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**MAIL LIST 3.0:** (Atari, Apple and North Star)  
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**THE VAULTS OF ZURICH:** by Felix and Greg Herlihy (Atari, 24K, PET)  
Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: THE OPEC OIL DEEDS!  
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**BRIDGE 2.0** by Arthur Walsh (Atari (24K), Apple TRS-80, PET, North Star and CP/M (MBASIC) systems)  
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**ENCOUNTER AT QUESTAR IV:** by Douglas McFarland (Atari, 24K)  
As helmsman of Rikar starship, you must defend Questar Sector IV from the dreaded Zentarians. Using your plasma beam, hyperspace engines and wits to avoid Zentarian mines and death phasers, you struggle to stay alive. This BASIC/Assembly level program has super sound, full player missile graphics and real time action.  
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**BETA FIGHTER:** by Douglas McFarland (Atari, 16K)  
See who will be the ace gunner in this action game set on a spectacular Martian landscape. BETA FIGHTER can be played with one or two players and uses player/missile graphics and delightful sound effects.  
**PRICE** ..... \$16.95 cassette \$20.95 diskette

**DRAWPIC:** by Dennis Zander (Atari 16K)  
DRAWPIC provides the user with an unbelievably easy way to create screens in graphics modes 3-7. Just sit back with your joystick and use POINT PLOT, DRAW LINE, RUBBER BAND fill and COLOR SET to create beautiful images on your Atari. Full or partial screen images are saved as string data in the program and can be instantly recalled and combined into new images using machine language subroutines. These graphic images can be easily incorporated into your own programs. The images of HODGE PODGE and the landscape of BETA FIGHTER were made using DRAWPIC.  
**PRICE** ..... \$29.95 cassette \$33.95 diskette

**T: A TEXT DISPLAY DEVICE:** by Joseph Wrobel (Atari 16K)  
T: is an auto-loading, co-resident assembly language routine which greatly expands the display capabilities of the Atari. It allows you to freely intermix both text and graphics without the use of modified display lists, PEEKS or POKES. This is done by defining a new device ("T:"); printing to that device puts text onto the screen. The size of the text is determined by the graphics mode used.  
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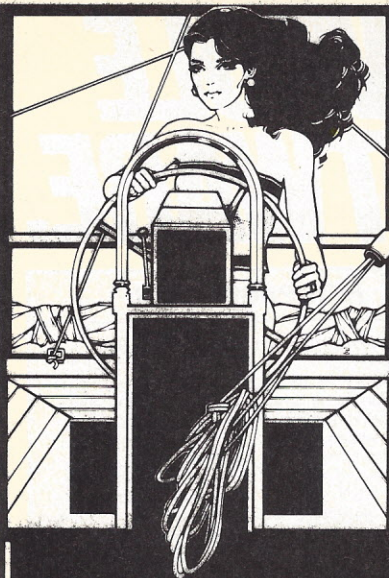
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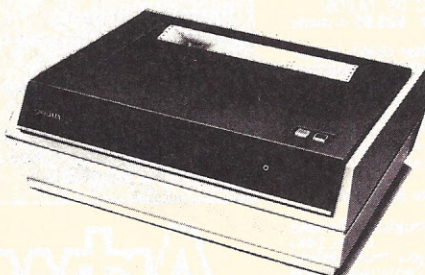
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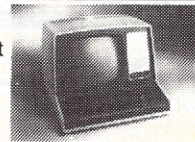
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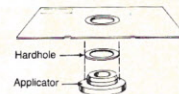


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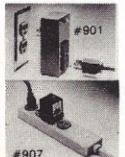
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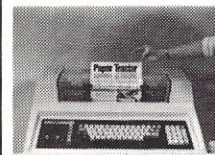
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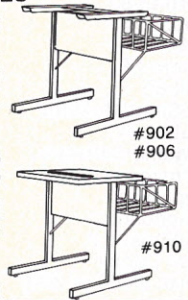
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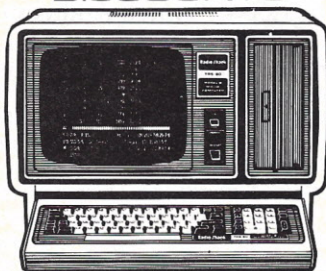






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Computer Image (305) 271-1224  
Computerland (305) 862-6202  
Computerland/Boca Raton (305) 368-1122  
Computerland/Ft. Lauderdale (305) 566-0776  
Computerland/W. Palm Beach (305) 684-3338  
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Computerland (813) 392-0771  
Computerland (813) 785-5579  
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Henry's News Stand (813) 536-3863  
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Poling Place (813) 541-2729  
Computerland (904) 224-9341  
Computerland (904) 731-2471  
Computer Shack (904) 396-1800  
Computer Store/Gulf Breeze (904) 932-0680  
Computer Sys. Resource (904) 376-4276  
Florida Book Store (904) 376-6066  
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Guild News Agency (404) 252-4166  
Electronics 21 Inc. (912) 352-0585  
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Computer Center (808) 448-2171  
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Radio Shack No. 7086 (808) 487-1509  
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The Partstore, Mario Iowa (319) 373-1803  
Business Data Processing (515) 276-8858

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Wine Micro Computers (312) 420-8813  
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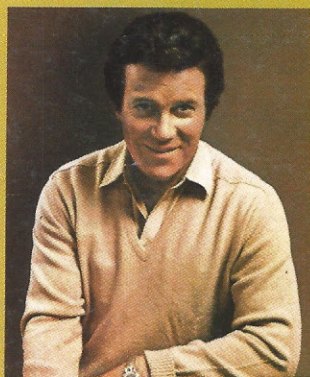
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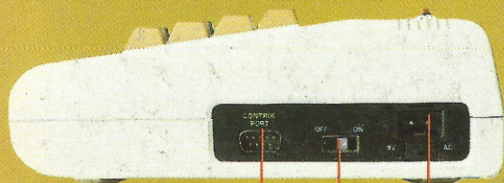


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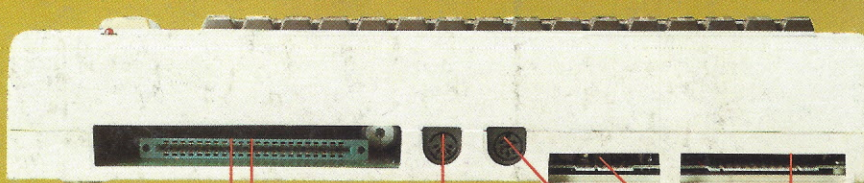
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Price*	\$299.95	\$399.00	\$525.00	\$399.00
Maximum RAM Memory	32K	16K	48K	32K
Keyboard Style	Full-Size Typewriter Style	Flat Plastic Membrane	Full-Size Typewriter Style	Calculator Style
Number of Keys	66	57	48	53
Programmable Function Keys	4	0	0	0
Graphic Symbols On Keyboard	62	0	0	0
Displayable Characters	512	256	192	256
Microprocessor	6502	6502	TI990	6809
Accessible Machine Language	YES	YES	NO	YES
Upper/Lower Case Characters	YES	YES	NO	NO
Operates with all Peripherals (Disk, Printer and Modem)	YES	NO	YES	YES
Full Screen Editor	YES	YES	YES	NO
Microsoft Basic	Standard	N/A	N/A	\$ 99.00
Telephone Modem	\$109.95	\$399.95	\$450.00	\$154.95

\*Manufacturer's suggested retail price Jan. 1, 1982



Read the chart and see why COMPUTE! Magazine<sup>1</sup> calls the VIC-20 computer "an astounding machine for the price." Why BYTE<sup>2</sup> raves: "...the VIC-20 computer unit is unexcelled as a low-cost consumer computer." Why Popular Mechanics<sup>3</sup> says "...for the price of around \$300, it's the only game in town that more than just a game." And why ON COMPUTING INC.<sup>4</sup> exclaims: "What is inside is an electronic marvel... if it sounds as if I'm in love with my new possession, I am."

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1 April '81 issue 2 May '81 issue 3 November '81 issue 4 Fall '81 issue

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